







Digitized by the Internet Archive
in 2012 with funding from
Boston Public Library

<http://www.archive.org/details/cityofbostonprop00bost>

E78600984



CITY OF BOSTON

PROPERTY REVALUATION FISCAL YEAR 1989



RAYMOND L. FLYNN, MAYOR

ASSESSING DEPARTMENT
THADDEUS J. JANKOWSKI, JR.
COMMISSIONER
Fall, 1988





G 8900182

December, 1988

Dear Property Owner/Reader:

The City of Boston has successfully completed the triennial revaluation of all taxable property as required by state law for Fiscal Year 1989. The major revaluation goals of the Assessing Department have been twofold. The first, to complete the revaluation "on time for 1989" in a fair, consistent, and equitable manner, has been accomplished.

Our second goal is to ensure that every taxpayer receives a full explanation of the procedures followed in determining the assessed value of his/her property. This goal is a continuous process that involves a variety of outreach efforts, each targeted to the special needs of the particular taxpayer group (homeowner, business owner, elderly person, veteran, widow, etc.). This report, which is part of that overall outreach effort, is oriented to the real estate professional, tax administrator, banker, financial officer and academician. It may be considered as a stand-alone document or as a matching piece with our report "Property Tax Facts and Figures, Fiscal Year 1989."

This report presents a scientific, technical description and analysis of the revaluation process, summary information about assessment levels, changes in assessment levels from preceding years, and summary evaluations of the quality of assessments. It is intended to be an informative tool about the technical elements of the revaluation.

As always, we welcome your comments and will be pleased to furnish additional information.

Sincerely,

Thaddeus J. Jankowski, Jr.
Commissioner of Assessing

PROPERTY REVALUATION IN THE CITY OF BOSTON

FISCAL YEAR 1989

TABLE OF CONTENTS

<u>SECTION 1. FY'89 REVALUATION PROCESS</u>	<u>PAGE</u>
Introduction	1
Summary of Results	3
Revaluation Planning	16
Data Collection	19
Valuation Standards	22
CAMA System	33
Value Review	36
Public Disclosure Process	37
 <u>SECTION 2. VALUATION METHODOLOGY: RESIDENTIAL</u>	
Neighborhood Delineation	46
Methodology Used: Multiple Regression Analysis	48
The Fiscal Year 1989 Project	57
General Approach/Residential Modelling	58
Condominium Modelling	61
Modelling Accuracy	63
 <u>SECTION 3. VALUATION METHODOLOGY: COMMERCIAL</u>	
Valuation Process	65
Income and Expense Data	66
Money Market Rates	68
Capitalization Rates	71
Central Business District	75
Current Market Sales Analysis	78
Commercial Cost System	82
Commercial Land Valuation	83
 <u>SECTION 4</u>	
Appendix I : Commercial Property	88
Appendix II : Quality Control Summary	110



FY'89 PROPERTY REVALUATION

SECTION I

INTRODUCTION

SUMMARY OF RESULTS

REVALUATION PLANNING

DATA COLLECTION

VALUATION STANDARDS

CAMA SYSTEM

VALUE REVIEW

PUBLIC DISCLOSURE PROCESS

PROPERTY REVALUATION
IN THE CITY OF BOSTON
FISCAL YEAR 1989

Introduction

Chapter 40 of Section 56 of the Massachusetts General Laws requires that all cities and towns complete a revaluation of taxable property and undergo certification of property values by the State Department of Revenue every three years. Triennial revaluation requires parcel specific data collection, detailed and documented economic research and analysis, multiple indications of value, and assessments at full and fair cash or market values with a high degree of uniformity of property values within and among the several property types.

In Fiscal Year 1989, the City of Boston conducted the triennial revaluation. The assessed values for FY 1989 represent the fair market value of the individual properties as of January 1, 1988. This report presents a technical description and analysis of the revaluation process and the qualitative character of the assessments.

The revaluation process contains a series of distinct steps. As outlined in the table of contents, these steps are described briefly as follows.

- (1) Planning, which identifies the specific tasks to be carried out, the workload, timetables and coordination of schedules for the respective tasks, the manpower and other resources required, and the basis to evaluate performance quality and quantity.
- (2) Data Collection, which provides current, accurate information on the characteristics of each individual property. This task includes the entry and storage of the property information in the department's computer data base.
- (3) Development of Valuation Standards, to establish the unit values for appraising properties in the respective use classes and locations, by means of the cost, market and income approaches to value. This includes the collection and analysis of information on sales of real property, rental rates, property income and expenses, real estate purchase financing and investment rates of return, and building construction costs and rates of depreciation -- and then the setting up of tables and formulas of unit values for uniform valuation of individual properties.

THE UNIVERSITY OF CHICAGO
LIBRARY
CHICAGO, ILL.

1950

THE UNIVERSITY OF CHICAGO
LIBRARY
CHICAGO, ILL.

THE UNIVERSITY OF CHICAGO
LIBRARY
CHICAGO, ILL.

THE UNIVERSITY OF CHICAGO
LIBRARY
CHICAGO, ILL.

THE UNIVERSITY OF CHICAGO
LIBRARY
CHICAGO, ILL.

THE UNIVERSITY OF CHICAGO
LIBRARY
CHICAGO, ILL.

- (4) Valuation, which is the process of calculating the appraised values of the individual parcels of property, using the property characteristics data and the valuation standards that are described previously. This process, as well as the management and analysis of property data and value indicators, is carried out with a computer assisted mass appraisal (CAMA) system.
- (5) Final Value (Field) Review, which is the process of physically reviewing all valuations for accuracy, consistency and equity.
- (6) Public Disclosure and Informal Assessment Review, which is the process where taxpayers are notified of their new assessments, and may request an informal review by the assessor's staff if they have any questions. Appropriate adjustments or corrections may be made by the assessor's staff before tax bills are issued.
- (7) Certification by the State Department of Revenue, in preliminary form after the final value review, and in final form after the public disclosure and informal hearings.

SUMMARY OF RESULTS

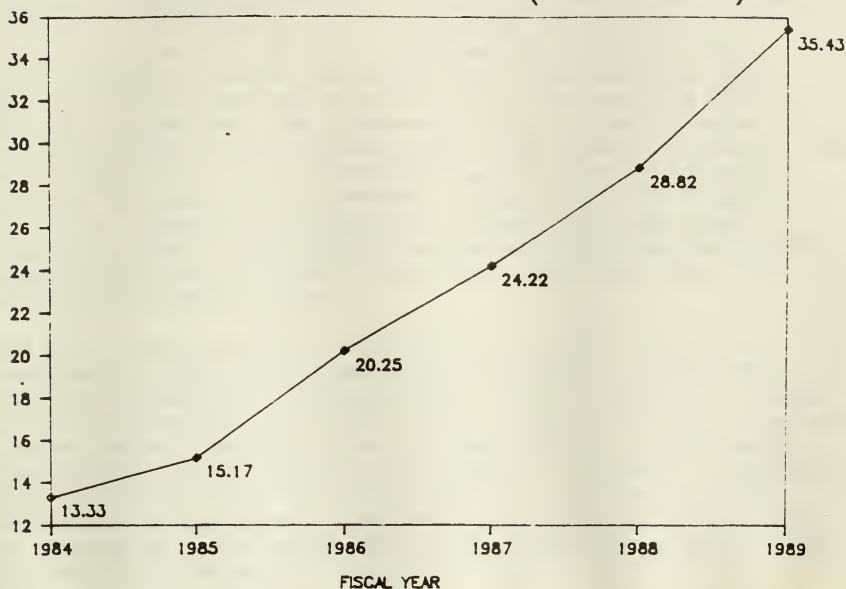
As a result of the FY'89 citywide revaluation of property, virtually all property assessed values have increased to some degree. This is due to the market appreciation of real estate values in the city over the last several years. The graph and table on the following page illustrate the historic trends of assessed values.

In brief, the changes from FY'88 to FY'89 are:

- o The Tax Base (total assessed value of all taxable property) increased from \$ 28.8 billion in FY 1988 to \$ 35.4 billion in FY 1989, an increase of 23%.
- o Since FY 1988, the average assessment on a single family home increased from \$120,215 to \$163,147.
- o The average assessment on a two-family home increased from \$132,474 to \$182,876.
- o The average assessment on a three-family home increased from \$ 125,905 to \$182,915.
- o The average assessment on a residential condominium increased from \$ 128,033 to \$157,405.
- o Since FY 1988, the average assessment on a four to six family home increased from \$255,584 to \$308,065.
- o The average assessment on apartment buildings increased from \$828,183 to \$1,017,146.
- o Since FY 1988, the average assessment on commercial property increased from \$2,113,979 to \$2,379,524.
- o The average assessment on industrial property increased from \$1,378,016 to \$1,637,530.

NOTE: The average assessed values (as shown above) differ slightly from those listed in the "FY89 Property Tax Facts and Figures". The values listed in the "Fact and Figures" report represent average tax and average values for properties that existed in both FY'88 and FY'89, whereas the average values listed here include a small number of new FY'89 parcels.

TOTAL ASSESSED VALUE (In Billions)



TOTAL ASSESSED VALUE *
(\$000's OMITTED)

	FY 8 8		FY 8 9		% CHANGE	
	# OF PARCELS	VALUE	# OF PARCELS	VALUE	# OF PARCELS	VALUE
Single-Family	28,971	3,482,743	29,029	4,735,693	0.2%	36.0%
Condominium	26,913	3,445,756	32,029	5,041,514	19.0%	46.3%
Two-Family	18,411	2,438,973	18,467	3,377,169	0.3%	38.5%
Three-Family	15,870	1,998,107	15,747	2,880,361	-0.8%	44.2%
Apt (4-6 Units)	3,339	853,396	3,170	976,565	-5.1%	14.4%
Res - Comm	2,480	1,207,658	2,459	1,425,164	-0.8%	18.0%
Apartment	2,243	1,857,615	2,134	2,170,589	-4.9%	16.8%
Commercial	4,524	9,563,641	4,518	10,750,690	-0.1%	12.4%
Industrial	995	1,371,126	967	1,583,492	-2.8%	15.5%
Comm Condo	1,009	399,794	1,140	647,853	13.0%	62.0%
Comm Land	3,136	330,289	2,985	480,980	-4.8%	45.6%
Res Land	10,223	127,621	9,997	157,631	-2.2%	23.5%
=====						
TOTAL	118,114	27,076,718	122,642	34,227,701	3.8%	26.4%

* excluding Personal Property

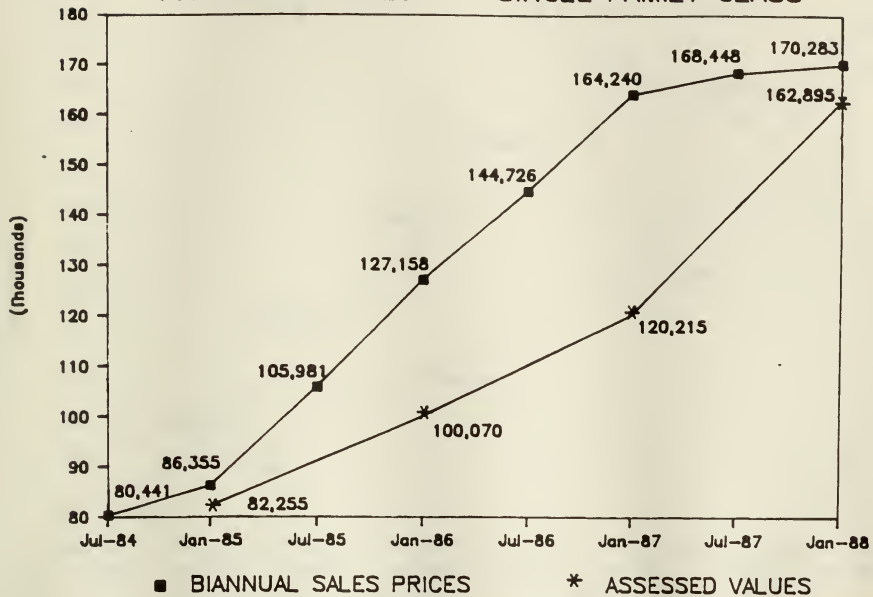
The changes indicated above from FY'88 to FY'89 are changes in average assessed values of properties in the respective use classes, and not the changes in market values. Of the total increases in assessment value indicated for residential properties, about 10% is attributable to market value appreciation during the base year 1987, while the remaining 90% is attributable to bringing the FY'88 assessments up to full market value, as indicated in the charts on the following page. This reflects two facts: that market values (sale prices) for residential properties leveled off very substantially in 1987, and that the trended assessed values for FY'88 were conservative. For commercial and industrial property, the same general condition applies, although about 20% of the change is attributable to 1987 market value appreciation, and 80% is attributable to bringing the FY'88 assessments up to full market value.

Along with these quantitative results of the FY 1989 revaluation, it is equally important to report on the quality of assessments. In the first place, the FY 1989 assessed values comply with the requirements of the State Department of Revenue as to the level and uniformity of assessments. The new assessed values are on average at a level of about 94%-95% of full market value. The assessments also reflect a high degree of uniformity, evidenced by a coefficient of dispersion of 10%. The coefficient of dispersion is a statistical measure of the degree of uniformity or "closeness" of assessed values, as compared to market sales. This is discussed in more detail in the methodology section of the report.

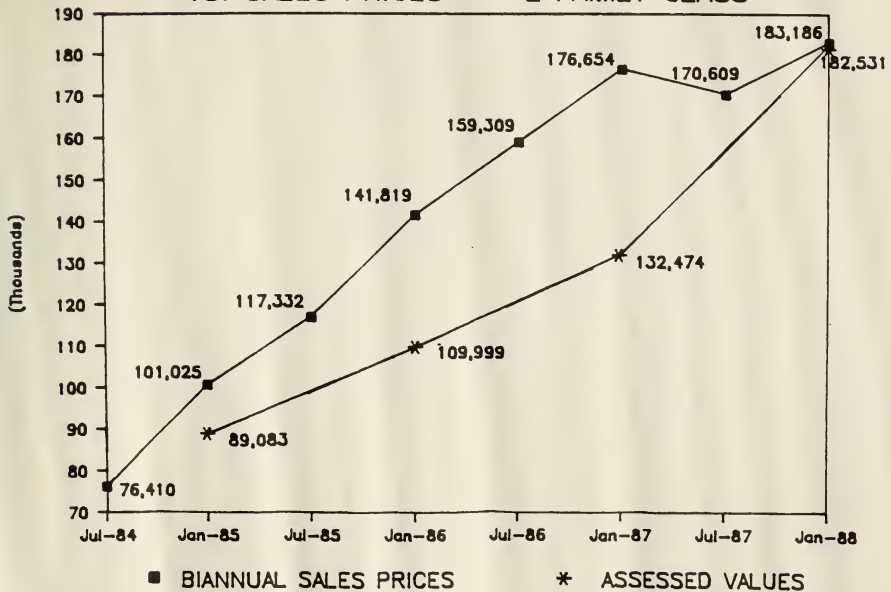
In addition to these city-wide measures of assessment quality, we also tested the level of residential assessments in the neighborhoods of the city. In summary, the high quality of residential assessments also applies neighborhood-by-neighborhood. This is indicated by the fact that assessed values are on average within a range of 90%-110% of market value in 80% of the residential assessment districts.



FY86 - FY89 AVERAGE ASSESSED VALUES VS. SALES PRICES - SINGLE FAMILY CLASS

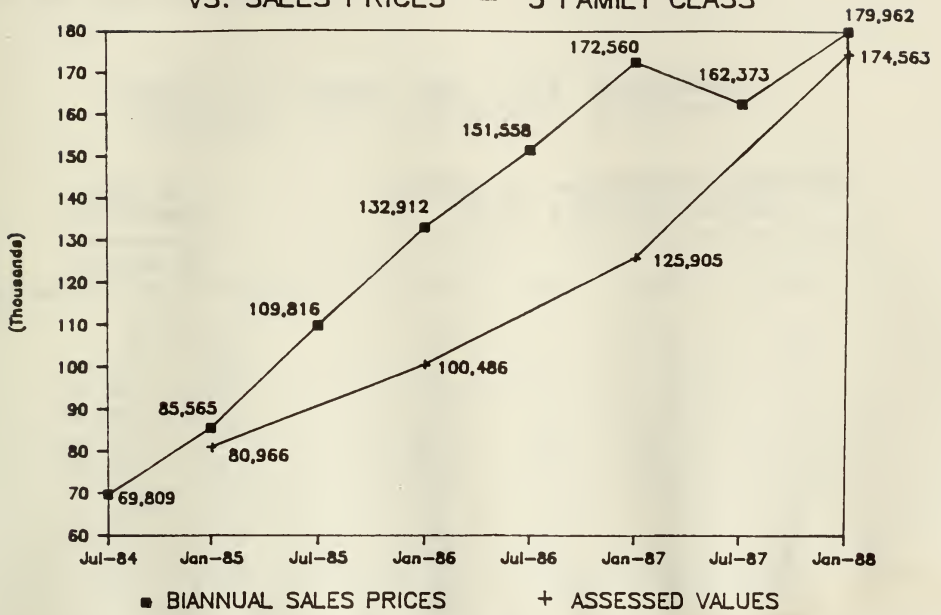


FY86 - FY89 AVERAGE ASSESSED VALUES VS. SALES PRICES - 2 FAMILY CLASS





FY86 - FY89 AVERAGE ASSESSED VALUES VS. SALES PRICES - 3 FAMILY CLASS





The following tables indicate the high quality of assessment levels that were attained in the FY 1989 revaluation, first for residential properties and second for commercial properties.

LEVELS OF FISCAL YEAR 1989 ASSESSMENTS:
RESIDENTIAL AND CONDOMINIUM DISTRICTS

LEVEL OF ASSESSMENT	NUMBER OF ASSESSMENTS DISTRICTS (WITH 5 OR MORE SALES)			
(Range of Assessment-to-Sale Ratios)	R1	R2	R3	CD
0 - 0.75	0	2	0	0
0.751 - 0.80	3	2	0	0
0.801 - 0.85	2	5	4	0
0.851 - 0.90	6	6	8	0
0.901 - 0.95	26	25	11	0
0.951 - 1.00	27	26	23	20
1.001 - 1.05	13	7	20	3
1.051 - 1.10	4	2	3	0
1.101 - 1.15	5	5	2	1
1.151 - 1.20	0	2	1	0
1.201 - 1.25	0	1	1	0
more than 1.25	3	1	0	0
GRAND TOTAL	89	84	73	24

MEDIAN ASSESSMENT/SALE RATIOS:
COMMERCIAL, INDUSTRIAL, AND APARTMENT CLASSES

	CITYWIDE		DOWNTOWN & BACK BAY		OUTLYING AREAS	
Property Class	# Sales	Median (Ratio)	# Sales	Median (Ratio)	# Sales	Median (Ratio)
A	52	.99	20	.95	32	1.02
R4	170	.97	33	.90	137	.98
RC	103	.99	14	.90	89	.99
C	112	.90	28	.87	84	.90
CC	54	.94	44	.96	10	.92
CL	29	.93	1	NA	28	.93
I	16	.86	0	NA	16	.86
TOTALS:	536		140		396	

The tables on the following pages indicate the current total assessed values for the major residential and commercial classes in each of the city's neighborhoods.

FY 89 VALUE SUMMARY

	FY 89 VALUES	COUNTS	AVG VALUE
COMMERCIAL	\$10,750,689,576	4,518	\$2,379,524
INDUSTRIAL	\$1,583,491,700	967	\$1,637,530
RES / COMM	\$1,425,164,000	2,459	\$579,571
COMM CONDOS	\$647,853,004	1,140	\$568,292
APTS (7+)	\$2,170,589,000	2,134	\$1,017,146
APTS (4-6)	\$976,564,600	3,170	\$308,065
COMM LAND	\$480,980,000	2,985	\$161,132
TOTAL	\$18,035,331,880	17,373	\$1,038,124
R-1'S	\$4,735,693,300	29,029	\$163,137
R-2'S	\$3,377,168,900	18,467	\$182,876
R-3'S	\$2,880,361,400	15,747	\$182,915
RES LAND	\$157,630,900	9,997	\$15,768
SUBTOTAL	\$11,150,854,500	73,240	\$152,251
RES CONDOS	\$5,041,514,400	32,029	\$157,405
TOTAL REAL PROP	\$34,227,700,780	122,642	\$279,086
PERSONAL PROP	\$1,205,971,359	9,908	\$121,717
GRAND TOTAL	\$35,433,672,139	132,550	\$267,323

SOURCE: VALUATION UNIT

FISCAL YEAR 1989 VALUES
R1 : RESIDENTIAL SINGLE FAMILY PROPERTY

NEIGHBORHOOD	# PARCELS	TOTAL VALUE	AVERAGE VALUE
East Boston	997	131,675,000	132,100
Charlestown	924	171,356,000	185,500
Alls/Brighton	1643	308,276,000	187,600
Central	32	6,284,000	196,400
Back Bay - Beacon Hill- Bay Village	409	295,420,000	722,300
Fenway-Kenmore	59	28,637,000	485,400
South End	317	110,495,000	348,600
South Boston	1481	208,952,000	141,100
Jamaica Plain	2069	391,537,000	189,200
Roxbury	823	90,640,000	110,100
North Dorchester	1792	231,686,000	129,300
South Dorchester	3439	468,453,000	136,200
West Roxbury	6324	1,110,200,000	174,000
Roslindale	2837	412,729,000	145,500
Mattapan	1207	143,341,000	118,800
Hyde Park	4676	636,015,000	136,000
<hr/>			
GRAND TOTAL	29,029	4,745,696,000	163,500
<hr/>			

FISCAL YEAR 1989 VALUES
R2 : RESIDENTIAL TWO FAMILY PROPERTY

NEIGHBORHOOD	# PARCELS	TOTAL VALUE	AVERAGE VALUE
East Boston	1249	193,812,000	155,200
Charlestown	490	107,219,000	218,200
Alls/Brighton	2612	610,826,000	233,900
Central	37	9,623,000	260,100
Back Bay - Beacon Hill- Bay Village	124	84,605,000	682,300
Fenway-Kenmore	21	9,541,000	454,300
South End	262	94,171,000	359,400
South Boston	1079	188,024,000	174,300
Jamaica Plain	1450	290,140,000	200,100
Roxbury	890	111,039,000	124,800
North Dorchester	1916	277,613,000	144,900
South Dorchester	3015	473,086,000	156,900
West Roxbury	1029	218,089,000	211,900
Roslindale	1705	305,733,000	179,300
Mattapan	1029	149,125,000	144,900
Hyde Park	1558	254,334,000	163,200
<hr/>			
GRAND TOTAL	18,466	3,376,800,000	182,900
<hr/>			

FISCAL YEAR 1989 VALUES
R3 : RESIDENTIAL THREE FAMILY PROPERTY

NEIGHBORHOOD	# PARCELS	TOTAL VALUE	AVERAGE VALUE
East Boston	2155	342,913,000	159,100
Charlestown	397	97,172,000	244,800
Alls/Brighton	860	220,169,000	256,000
Central	119	33,165,000	278,700
Back Bay - Beacon Hill- Bay Village	106	73,816,000	696,400
Fenway-Kenmore	64	28,656,000	447,800
South End	273	98,617,000	361,300
South Boston	1649	310,718,000	188,400
Jamaica Plain	1440	282,446,000	196,100
Roxbury	1372	201,236,000	146,700
North Dorchester	3414	531,163,000	155,600
South Dorchester	2404	385,909,000	160,500
West Roxbury	88	21,219,000	241,100
Roslindale	618	122,850,000	198,800
Mattapan	472	71,654,000	151,800
Hyde Park	316	58,657,000	185,600
<hr/>			
GRAND TOTAL	15,747	2,880,360,000	182,900
<hr/>			



FISCAL YEAR 1989 VALUES
CD : RESIDENTIAL CONDOMINIUM PROPERTY

NEIGHBORHOOD	# PARCELS	TOTAL VALUE	AVERAGE VALUE
East Boston	500	55,535,000	111,100
Charlestown	1111	205,239,000	184,700
Alls/Brighton	7007	791,985,000	113,000
Central	4016	895,764,000	223,100
Back Bay - Beacon Hill- Bay Village	5512	1,327,688,000	240,800
Fenway-Kenmore	3483	496,560,000	142,600
South End	3112	516,044,000	165,800
South Boston	907	117,625,000	129,700
Jamaica Plain	2165	285,112,000	131,700
Roxbury	100	8,721,000	87,200
North Dorchester	494	45,108,000	91,300
South Dorchester	575	55,967,000	97,300
West Roxbury - Roslindale	1399	166,355,000	118,900
Mattapan - Hyde Park	532	46,552,000	87,500

GRAND TOTAL	30,913	5,014,255,000	162,200



COMMERCIAL NEIGHBORHOOD ANALYSIS
 ASSESSED VALUES
 <<< LAND USE = COMMERCIAL >>>

NEIGHBORHOOD

FY 89 VALUE

	# PARCELS	TOTAL VALUATION	AVERAGE VALUATION (per parcel)
East Boston	323	123,505,500	382,370
Charlestown	114	162,742,504	1,427,566
Allston-Brighton	438	368,939,500	842,328
North End	126	308,719,000	2,450,151
Central Business District	524	6,111,835,900	11,663,809
Back Bay	427	2,437,016,700	5,707,299
South End	150	165,520,000	1,103,467
South Boston	528	400,195,004	757,945
Jamaica Plain	269	66,581,000	247,513
Roxbury	244	52,110,500	213,568
North Dorchester	115	134,681,000	1,171,139
South Dorchester	440	148,543,500	337,599
West Roxbury	188	100,898,500	536,694
Roslindale	195	49,215,500	252,387
Mattapan	222	51,425,500	231,646
Hyde Park	212	68,596,000	323,566

<<< LAND USE = INDUSTRIAL >>>

NEIGHBORHOOD

FY 89 VALUE

	# PARCELS	TOTAL VALUATION	AVERAGE VALUATION (per parcel)
East Boston	53	51,579,000	973,189
Charlestown	30	66,330,500	2,211,017
Allston-Brighton	96	150,393,500	1,566,599
North End	24	45,696,000	1,904,000
Central Business District	40	106,758,500	2,668,963
Back Bay	20	51,642,500	2,582,125
South End	62	90,643,000	1,461,984
South Boston	369	855,153,000	2,317,488
Jamaica Plain	49	14,831,000	302,673
Roxbury	40	13,965,000	349,125
North Dorchester	18	19,300,500	1,072,250
South Dorchester	52	25,401,200	488,485
West Roxbury	16	12,770,500	798,156
Roslindale	9	4,323,000	480,333
Mattapan	16	9,037,500	564,844
Hyde Park	73	65,667,000	899,548

COMMERCIAL NEIGHBORHOOD ANALYSIS
 ASSESSED VALUES
 <<< LAND USE = APARTMENTS (7+ UNITS) >>>

NEIGHBORHOOD

FY 89 VALUE

	# PARCELS	TOTAL VALUATION	AVERAGE VALUATION (per parcel)
East Boston	44	27,447,000	623,795
Charlestown	16	20,156,500	1,259,781
Allston-Brighton	363	494,788,000	1,363,052
North End	88	47,030,000	534,432
Central Business District	106	73,868,500	696,873
Back Bay	651	750,237,500	1,152,439
South End	213	142,970,000	671,221
South Boston	46	33,928,000	737,565
Jamaica Plain	73	69,080,000	946,301
Roxbury	258	151,290,000	586,395
North Dorchester	16	31,108,000	1,944,250
South Dorchester	90	58,229,000	646,989
West Roxbury	24	55,695,500	2,320,646
Roslindale	14	33,872,000	2,419,429
Mattapan	85	92,251,000	1,085,306
Hyde Park	47	88,638,000	1,885,915

<<< LAND USE = APARTMENTS (4-6 UNITS) >>>

NEIGHBORHOOD

FY 89 VALUE

	# PARCELS	TOTAL VALUATION	AVERAGE VALUATION (per parcel)
East Boston	200	40,501,500	202,508
Charlestown	64	19,545,000	305,391
Allston-Brighton	282	99,450,500	352,661
North End	257	72,904,000	283,673
Central Business District	134	58,327,500	435,280
Back Bay	283	172,940,000	611,095
South End	696	246,624,500	354,346
South Boston	174	39,401,500	226,445
Jamaica Plain	212	50,201,500	236,800
Roxbury	272	45,197,000	166,165
North Dorchester	49	10,431,000	212,878
South Dorchester	197	40,838,000	207,299
West Roxbury	26	7,659,500	294,596
Roslindale	77	21,039,500	273,240
Mattapan	160	32,314,500	201,966
Hyde Park	86	19,046,000	221,465

REVALUATION PLANNING

Planning for the FY'89 revaluation was one of the most critical and effective elements of the entire process. Its importance cannot be over-stated.

The revaluation process contains many production-line characteristics, wherein many tasks are dependent on the completion of other tasks. Accordingly, the work, workloads, and manpower for each of the tasks must be scheduled in a manner that provides for progressive completion of the respective tasks within the overall timeframe of the entire project. This seems obvious, but it was accomplished largely with the emphasis on effective management discipline. Additionally, the planning and scheduling of the work and manpower established definite goals that provided a high degree of motivation to the entire staff. It also established the basis or yardstick against which to measure actual performance.

The planning process was well-defined, in the sense of identifying all of the tasks to be carried out, estimating the workloads in terms of parcels for measurable tasks, and time for non-measurable tasks, establishing rates of manpower productivity for each task, determining the elapsed time and total manpower required for each task. The overall timetable for the entire project and for the individual tasks was established by working back from the tax bill target date of November 4, 1988. Except for earlier data collection of commercial property by the R. M. Bradley Company, the revaluation period started effectively after the FY 1988 tax bills were issued in November, 1987. The planning work was carried out and finalized during the period of June - August, 1987.

A key feature contributing to the effectiveness of the revaluation planning was the total integration of the plan, including the tasks and responsibilities of all divisions in the Assessing Department. Some highlights of this feature include the following:

(a) the urgency for the Tax Administration Division to complete the processing of sales, new condo's, other appendas, etc. in a timely manner was clear and was accomplished without the delays previously related to this work,

(b) the regular annual assessment maintenance work by the Valuation Division was integrated with the one-time type of activities for the revaluation year,

(c) the development and testing of valuation standards was accomplished by the Valuation Standards Division with meaningful assistance from the appraisal staff,

(d) requirements of data entry and data processing were anticipated and unnecessary delays avoided, and

(e) the role of taxpayer's assistance and other public relations activities was identified and coordinated with the public disclosure and hearing task.

A copy of the plan/schedule for the FY 1989 revaluation is shown on the following pages.

FY 1989 REVALUATION TIMELINES
NUMBER OF PARCELS PER MONTH

	1987			1988											
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	
1 R.M.B. COMM DATA COLL.	557	333													
2 MAINTENANCE-TAX ADMIN															
A) SALES-ABSTRACTED (20,300)	17500	2500	2500	1500											
B) SALES-VERIFIED (20,300)	6300	7500	5000	1500											
C) APPENDA'S/NEW CONDO'S (6000)	2800	1200	1200	800											
3 MAINTENANCE-VALUATION															
A) SALES-COMM-800**															
2 people @ 8/day-48days	N/A	180	310	310	208	208									
B) SALES-RESO/CONDO'S-8000**															
9 people @ 18/day-48 days	N/A	1650	3170	3170	2150	2150									
C) NEW CONDO'S-5000**															
4 people @ 25/day-48 days	N/A	2200	1400	1400											
D) PERMITS/STATUS/APPENDA'S															
13 people @ 18/day-25 days	N/A	N/A	N/A	3000	3000	4000	4000	4000							
** IST 8 MONTHS															
4 CONDO MAIN REVIEW			2500												
5 FY88 ABATEMENT REVIEW (2500 APP'S)	N/A	154	345	345	154										
6 A.T.B. TRIAL LIST-FY86&FY87 2000		250	250	250	250	250	250	250	250						
7 RESEARCH STANDARDS															
A) LAND RATES															
1) RES															
2) COMM															
B) COST TABLE UPDATE															
1) RES															
2) COMM															
C) I&E REVIEW (2700)		1350	1350												
D) MARKET RENT REVIEW															
E) CAP RATE ANALYSIS															
F) RESO/CONDO MODELING	TRAIN														
G) FINAL REVIEW PREP/REPORTS															
8 COMMERCIAL VALUATION & REVIEW															
-14,000 PROP'S					FEB.23										
A) MULTI-VAL PROCESS															
B) CARD PRINT															
C) AUDIT PREP															
D) FIELD REVIEW															
1) TRAINING															
2) FIELD REVIEW-14,000															
6 people @ 40/dy-62 days									2300	4700	4700	2700			
									APR.13			JUL.18			

FY 1989 REVALUATION TIMELINES
NUMBER OF PARCELS PER MONTH

[illegible]

DATA COLLECTION

The purpose of the data collection phase of the FY 1989 revaluation was to assure that current, accurate information existed on the record of each individual property. The data collection work was distinctly different for the residential and commercial/industrial properties.

For residential property, data had been collected and extensively reviewed for the FY 1986 revaluation. Since then, property data for residential properties has been reviewed and updated in the process of the assessment maintenance work each year. This includes the field inspection of properties with sales, permits, new condominiums, other appendas, during each of the intervening years of 1985, 1986, and 1987 leading to the FY 1989 assessment date of 1/1/88.

In view of the active real estate market for transfers, improvements, new construction, and conversions, the assessment maintenance work provided for review of property characteristics in a meaningful proportion of the total number of residential parcels. The number of parcels subject to maintenance review in 1987 and 1986 is shown in the following table, representing about 18% of the total residential parcels each year.

	<u>1987</u>	<u>1986</u>
Sales of R1, R2, R3 and CD properties	6799	7889
Permits on residential properties	3570	3616
New condominium units	4932	4705

For commercial, industrial and apartment (C-I-A-R4-RC), properties, it was necessary to recollect the property characteristics data on all C-I-A parcels located outside of Wards 3, 4, and 5. The data on these types of property in Wards 3, 4, and 5 had been reviewed frequently and kept up to date in the recent years.

In view of the one-time nature and time constraints of recollecting the property data on the C-I-A parcels, this work was done under contract by R. M. Bradley Company of Boston. Specifically, the Bradley Company appraisers recollected the property data on approximately 9150 commercial parcels outside of Wards 3, 4, and 5. This work was done during the period June - November, 1987.

At the outset of the work, the Bradley appraisers were given specific training to familiarize them with the data elements to be recollected. They were furnished copies of the existing property record cards, and they made corrections directly on these cards for subsequent data entry. Supervision was provided by senior appraisers from the Bradley Company, with regular monitoring and quality testing by senior appraisers from the Assessing Department.

Quality Control on the C-I-A data collection was accomplished by the senior staff appraisers, who recollected and compared property data on a sample of about five percent of the parcels. The quality control procedure and results of the Quality Control analysis are outlined in Appendix II of this report.

In addition to quality control on the C-I-A data collection, similar quality control procedures were applied to the property inspection of sales, permits, new condo's, etc. in the course of regular assessment maintenance. The quality control organization and process is established as a regular element in the Valuation Division.

Along with recollecting property data on the C-I-A properties, the field collection work included gathering information whenever possible on property rents and expenses. A copy of the market data field sheet is shown on the following page. Usable information on rents was obtained in this manner for about 15% of the parcels inspected.



CITY OF BOSTON - ASSESSING DEPT
MARKET DATA FIELD SHEET
COMMERCIAL - INDUSTRIAL - APARTMENT

LOCATION _____

PARCEL # _____

CAD # _____

RENTAL INCOME DATA

#	OCC CODE	FIN CODE	# UNITS (SF/Apts)	UNIT TYPE	RENT / MONTH (xx,xxx)	RENT TYPE	RENT INC	FLR LOC	COND STAT	RENT DATE	SRCE	RENT / SF
1					/					/		
2					/					/		
3					/					/		
4					/					/		
5					/					/		
6					/					/		
7					/					/		
8					/					/		
	RTOC	RTFC	RTUN	RTUT	RTRT	RTTY	RTAM	RTFL	RTST	DATE	RSRC	****

(This section not for data entry)

BUILDING OPERATING EXPENSES

Paid by: (O)Owner
(T)Tenant

UTILITIES:

HEAT \$ _____

ELEC \$ _____

OTHER UTL \$ _____

EXT.MAINT \$ _____

INT.MAINT \$ _____

INSURANCE \$ _____

R.E.TAXES \$ _____

OTHER EXP \$ _____

SALES DATA

SALE \$\$ _____

SALE DATE _____

SALE \$\$/SF _____
(\$\$/UNIT)

REMARKS _____

DATE _____ I.D. _____



VALUATION STANDARDS

Development of Valuation Standards:

The development of valuation standards provides for the second term in the following equation:

$$\text{Property Characteristics} \times \text{Valuation Standards} = \text{Value}$$

Valuation standards may be defined as the unit values or equations that are utilized in the appraisal of individual properties. They are developed distinctly for the cost, market or income approaches to value, as applicable to both residential and commercial properties. These unit values are expressed in a variety of forms and terms, including:

- Delineation of neighborhoods
- Building cost tables
- Depreciation tables
- Land values
- Multiple regression equations
- Adjusted sale prices of comparable properties
- Economic rents, vacancy and operating cost ratios, and capitalization rate

The valuation standards phase of the FY 1989 revaluation consisted of a series of analyses and the establishment of the unit values and equations for appraising properties in each of the use classes. Not only are separate standards developed for the cost, market or income approaches to value, but also distinctly different types of information and analytical methods are used for the residential and commercial classes of property.

In view of these technical characteristics, this section of the report contains only a general overview and highlights of this information. More detailed descriptions of the valuation methodologies are contained in Section 2 for residential property, and Section 3 for commercial and industrial property, which describe the separate procedures, data, and results of developing the FY 1989 valuation standards.

1882-1883

1882-1883

1882-1883

1882-1883

1882-1883

1882-1883

1882-1883

1882-1883

Residential Valuation Standards

Residential properties are appraised primarily by the market approach to value, and secondarily by the cost approach. Accordingly, the valuation standards for residential property are designed to satisfy the requirements of these two approaches.

Specifically, the market approach utilizes the application of multiple regression (MRA) equations, that are developed by quantifying the relationship of property characteristics (location, style, size, etc.) with the selling prices of properties. For the cost approach, as the name implies, the valuation standards consist of unit values to determine the cost to replace the buildings, and depreciation allowances (for effective age and condition of the building) to calculate replacement cost less depreciation. Land values are added to determine the total cost value of land and buildings. For both approaches, the standards also include the delineation of neighborhoods in order to reflect the important influence of location on the market value of real estate. Some highlights of the valuation standard processes are summarized in the following pages.

(1) Multiple regression analysis (MRA) is the principal methodology for determining the market value of residential property (see Section 3). In the simplest of explanations, it is a statistical technique, made feasible with computer technology, to determine from actual sales how market value relates to individual property characteristics or explanatory variables. Some of the more indicative characteristics are: location, style, size of building, lot size, etc.

Once these variables are identified, and small homogeneous neighborhoods are defined, a value equation based on sold properties is generated. This equation identifies a value coefficient or factor attributable to each characteristic, which collectively add up to the market value (sale price) of the property. The equation is then used in the valuation of unsold properties.

MRA was used for the second time for the FY 1989 revaluation, with several refinements over the first application in the FY 1986 revaluation. Some considerations of note are:

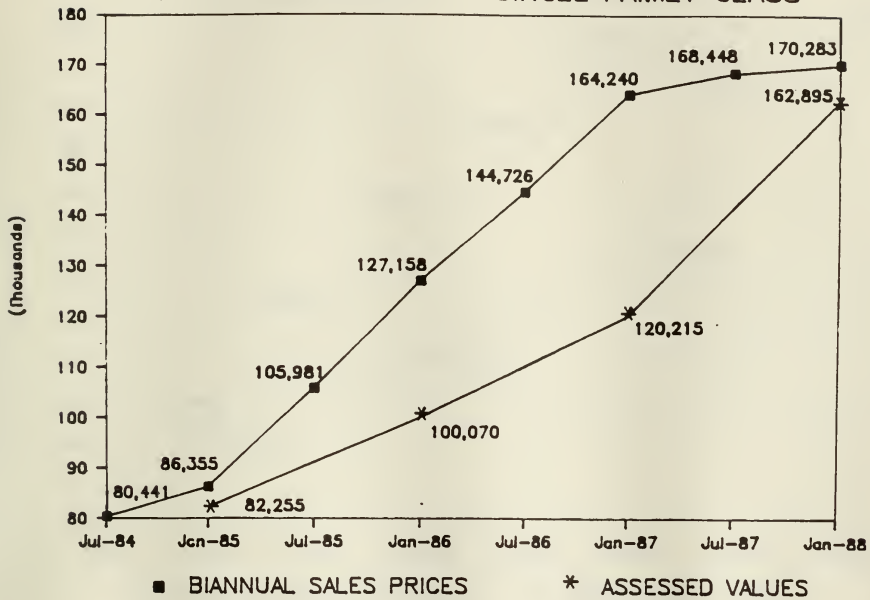
- (a) The number of residential sales continued to be sufficiently large to assure reliability of the MRA results. Arms-length sales during 1986 and 1987 (time adjusted) were used, which totaled 4,568 one, two and three family homes, and 8,389 condominium units.
- (b) In place of five regional models used in 1986, the FY 1989 MRA equations were developed more effectively with one global model that contained a neighborhood influence factor for each of the 105 residential neighborhoods.
- (c) The elimination of non-representative sales and the continuous refinement of the MRA equations was greatly facilitated by participation of the appraisal staff. The staff field-verified sales transactions, values, and property characteristics of parcels identified as outliers, i.e. those sales that were outside of a normal acceptable range.



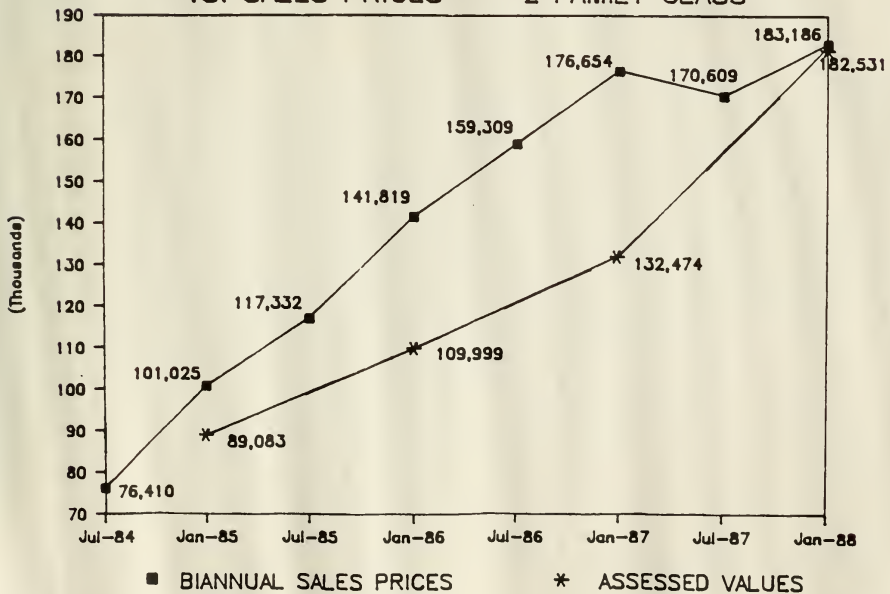
(d) Two major improvements were made in the MRA modelling process for residential condominiums. In place of one overall model, two models were designed and used to better reflect value differences based on building style, i.e. the difference between conventional apartment-type buildings and non-conventional condominiums such as deckers, duplexes, row houses, townhouses, etc. The second major improvement was to introduce a new element or characteristic into the MRA equation, identified as the condominium appeal rating for the condo main building. This element adds a meaningful measurement of the overall appeal or attractiveness of the buildings.

(2) Along with using the MRA modelling process to value individual residential properties, market sales and assessment/sales ratios were used to predict value trends, to identify neighborhoods, property types or characteristics for special appraiser review, and to test the quality and performance of the MRA equations and the final assessed values. The charts on the following page show the overall trends and relationships of average assessed values and average sales prices for one, two and three family homes during the last three years.

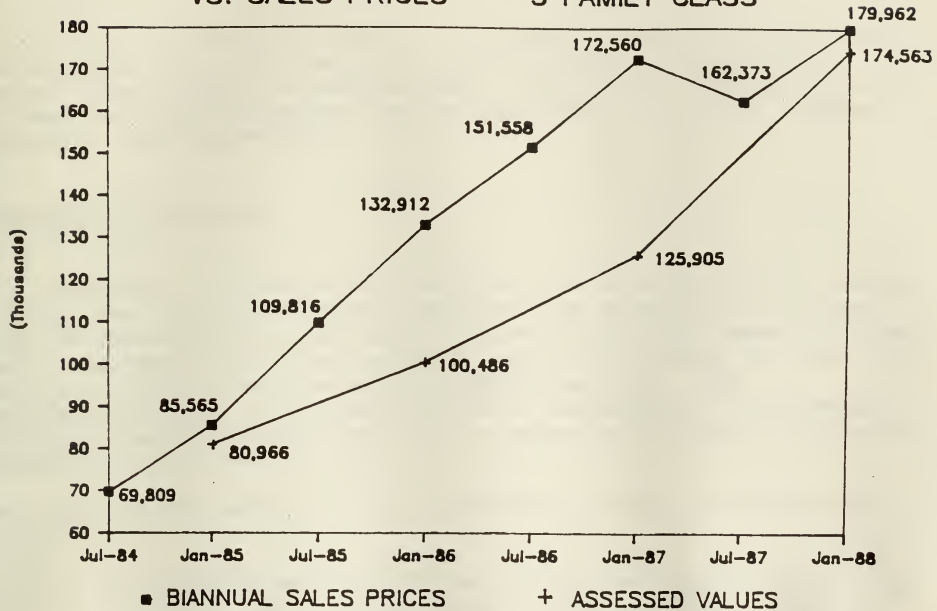
FY86 - FY89 AVERAGE ASSESSED VALUES
VS. SALES PRICES - SINGLE FAMILY CLASS



FY86 - FY89 AVERAGE ASSESSED VALUES
VS. SALES PRICES - 2 FAMILY CLASS



FY86 - FY89 AVERAGE ASSESSED VALUES VS. SALES PRICES - 3 FAMILY CLASS





As the graphs indicate, market values (sales prices) leveled off during 1987. However, it was still necessary to make substantial increases in assessed values to reach the mandated market value level. This was due to the fact that the trending adjustments to assessed values in the years between revaluations were conservative.

Assessment Ratio Analysis

Assessment ratio studies and statistics indicate several useful things, including: the level of assessments, guidelines for adjustments to assessed values (to reach market values), and the degree of uniformity among individual property assessments. They are analytical and quality testing tools that are used on a city-wide or neighborhood-by-neighborhood basis. The assessment-to-sale ratio indicates the level of assessments; its reciprocal, the sale-to-assessment ratio, indicates the percentage adjustment required for assessments to reach market value.

Some of the uses and results of ratio studies are outlined in the following summary:

- (a) Ratio studies were regularly made during the MRA modelling process, to identify outlier sales, and to measure performance (level and uniformity) of the MRA equations. The MRA equations, after several iterations and ratio tests, were accepted with levels of assessments at about 95% of market value and uniformity at about 10% dispersion.
- (b) Ratio studies were used as an operating tool to assist in pin-pointing final field review work in neighborhoods where preliminary assessments needed further review.

Specifically, on a neighborhood basis, the sale-to-assessment ratio (1987 sales and 1/1/87 values) was compared to the proposed change in average assessed value (before the field review). The ratios indicated the general level of change that should be made, and the average value data indicated the change proposed to be made. Wide differences (beyond ten to fifteen percentage points) identified neighborhoods where further analysis of assessments, MRA equations, property data, or sales was required. On a management by exception basis, this analysis and data identified a meaningful number of neighborhoods where special review and appropriate adjustments were made to assure the desired quality of assessments.



- (c) Once the field review was completed, the same comparative analysis (outlined above) was done using the final assessed values as an additional quality test of assessments. This test indicated a high quality of assessments. Of those neighborhood districts with more than five sales, 89% of single family, 84% of two family, and 75% of three family districts were in the range considered acceptable, with variances below fifteen percentage points.
- (d) A further use of assessment ratios was to demonstrate compliance with the quality requirements of the State Department of Revenue--that the assessments on average are approximately 94%-95% of market value, and that the coefficient of dispersion was approximately 10%, as required by the state.
- (e) A final quality test was made of assessment ratios on a neighborhood basis. The high quality of assessments is indicated again, by the large proportion of neighborhoods where the assessments are within 90%-110% of the market value, as shown in the following table.

FREQUENCY DISTRIBUTION OF RESIDENTIAL DISTRICTS

According to level of FY'89 Assessments

<u>Level of Assessment</u>	<u>Number of Districts *</u>			
	R1	R2	R3	CD
0 - 0.75	0	2	0	0
0.751 - 0.80	3	2	0	0
0.801 - 0.85	2	5	4	0
0.851 - 0.90	6	6	8	0
0.901 - 0.95	26	25	11	0
0.951 - 1.00	27	26	23	20
1.001 - 1.05	13	7	20	3
1.051 - 1.10	4	2	3	0
1.102 - 1.15	5	5	2	1
1.151 - 1.20	0	2	1	0
1.201 - 1.25	0	1	1	0
more than 1.25	<u>3</u>	<u>1</u>	<u>0</u>	<u>0</u>
GRAND TOTAL	89	84	73	24
Percentage of Districts within 90% - 110%:	79%	71%	78%	96%

(*: assessment districts with 5 or more sales)

(3) As previously indicated, the cost basis valuation standards consist of building cost and depreciation tables and land values for residential properties. These were updated for the FY 1989 revaluation to reflect the current level of costs and market values.

The cost tables utilized with the Sigma CAMA system are those from the Marshall & Swift Valuation Service. They were updated from 1986 levels on the basis of changes in construction costs since that time. Land values were updated by means of analyzing the limited number of available sales, and by computing land residuals for improved parcels that had sold (sales price minus building cost).

Total cost basis standards for land and buildings were then calibrated against market values (sales prices), and necessary refinements were made to assure realistic cost basis values.

As with the field checking of sales for MRA modelling, a key feature in assuring sound land values was the review and analysis furnished by the appraisal staff. This was meaningful in maintaining appropriate ratios of land to total improved value as well as establishing sound land values.

Commercial and Industrial Valuation Standards

Commercial, industrial, and apartment properties (C-I-A) are appraised primarily by the income capitalization approach to value, and secondarily by the cost approach. The valuation standards are designed to satisfy the requirements of each of these approaches. Values produced by the income approach are determined by capitalizing the estimated economic net income of the property.

The valuation standards utilized here are identified as the economic rent (gross income) per rental unit, operating expense ratio, and capitalization rate, for designated stratifications of property, grouped according to use or occupancy, location, and tenant appeal index of the property.

The valuation standards for the C-I-A classes of property were developed by a systematic collection and analysis of information on rental rates, operating expenses, and the elements for determining capitalization rates. Significant features of this process and the resulting data are summarized in the following:

- (1) Rental rates, income, and expense data were gathered from several sources, including (a) the Assessor's annual questionnaire survey among property owners and managers, (b) a number of published real estate management sources, and (c) on-site collection by our data collection staff and contractor in the course of collecting data on property characteristics.

This last source of on-site collection of income and expense data was a new and effective feature for the FY 1989 revaluation. It will be continued as a regular practice in the annual assessment maintenance work. The analysis and use of the income and expense data was improved for the FY 1989 revaluation by automating the data base from these different sources.

- (2) The income and expense data indicates the level of rent increases during the three years between revaluations (1985-1987) that are reflected in the current rent tables. Some examples are: 7%-10% increases for office towers downtown; 15%-20% for office space outside of downtown; 10%-12% for average quality apartments; 25%-28% for higher quality apartments.

In general, the amount or proportion of rent increases was lower in 1987 than in the preceding two years. This data also indicates that the operating expense ratio to gross income has remained constant during this period of time.

- (3) The capitalization rates were developed on the basis of a standard mortgage-equity formula. The data on interest rates, equity return, loan-to-value ratio, holding time of investments, and other financial factors was obtained from recognized published reports, and from an extensive survey among Boston-area banks and other financial institutions. In view of the continued stability of interest and mortgage rates during 1985-1987, the capitalization rates used for the FY 1989 revaluation were the same rates as used in the previous year's trending process.
- (4) As with the residential valuation standards, development of the commercial valuation standards included meaningful participation of the appraisal staff in the field review, and analysis of the standards and of the values generated with the new standards. A new feature of the FY 1989 revaluation process involved a better organization and presentation of the data on rents and sales for analysis and comparative purposes. This permitted the documentation of the available rental and sales data from all sources according to specific property types (by occupancy and location) along with the proposed (and then final) standards for these same use and location categories. A sample of this form of analytical data is shown on the following page.

MARKET DOCUMENTATION

Rental /Sale Information

Occupancy type: General Office

GROUP-3

CAD(S)	INCOME/EXPENSE STATEMENTS\$	R.N.BRADLEY COLLECTION	SPARKLING/SLY QUARTERLY\$	SALE(S)	EIP/VAC T.A.I. CAD	10,000	10,510FFICES			
						451	401	351	301	251
						1	3	5	7	9
005-020	4.15	7.51		66.13	005-020					
	5.25	9.01		75.59	MKT RENT	2.33	5.60	8.00	11.56	14.94
	7.00	9.35		103.85	VAL/S.F.	12.22	29.33	41.90	60.55	78.26

025-040	4.67 11.04	6.00 8.28	22.00		025-040 MKT RENT VAL/S.F.	2.99 15.67	6.02 31.53	10.00 52.38	14.69 76.94	18.00 94.29
---------	---------------	--------------	-------	--	---------------------------------	---------------	---------------	----------------	----------------	----------------

045-055	3.29 8.78 11.45 22.62	6.25 5.40 5.53 11.01 13.50 22.06		69.49 91.00 140.82	045-055 MKT RENT VAL/S.F.	4.84 25.35	6.02 31.53	11.00 57.62	14.01 73.38	18.00 94.29
---------	--------------------------------	---	--	--------------------------	---------------------------------	---------------	---------------	----------------	----------------	----------------

GROUP 3 A

CENTRAL BUSINESS DISTRICT

				10,000		10.51OFFICES		
				451		391		
				1		3		
				T.A.I.		5		
				CAD		7		
				060-075		9		
				MKT RENT		251		
				VAL/S.F.		231		
060-075	5.17	20.00-		5.90	9.52	15.00	18.90	28.08
	16.00	29.0011	170.34	23.89	40.67	61.90	91.96	132.00
	21.00							

				10,000		10.51OFFICES			
				EIP/VAC	351	321	241	221	221
				T.A.I.	1	3	5	7	9
				CAD					
				080					
080	8.00	20.00-							
	10.00	29.0011							
	15.00		224.61	MKT RENT	11.97	14.00	20.70	25.98	30.06
			240.97	VAL/S.F.	74.09	90.67	149.83	192.96	223.30

				10,000	10.51OFFICES				
				EIP/VAC	431	381	331	271	211
				T.A.I.	1	3	5	7	9
				CAD					
085	7.00	20.00-	108.53	085					
	12.00	29.0011	-198.75	MKT RENT	5.98	9.94	13.50	17.95	28.08
	16.00		7 SALES	VAL/S.F.	32.48	58.69	86.14	124.81	211.27
	18.00								
	24.00								

Unlike residential property, the number and variety of commercial sales are too few and disparate to develop singular market-based valuation standards. However, the sales can be used for an overall quality test of values, and as such they support the underlying commercial valuation standards. The following table shows the assessment/sales ratios for the FY 1989 assessments and 1986-1987 time adjusted sales.

Median Assessment/Sales Ratios

<u>Property Class</u>	<u>City-wide</u>		<u>Downtown & Back Bay</u>		<u>Outlying Areas</u>	
	<u># Sales</u>	<u>Ratio</u>	<u># Sales</u>	<u>Ratio</u>	<u># Sales</u>	<u>Ratio</u>
A	52	.99	20	.95	32	1.02
R4	170	.97	33	.90	137	.98
RC	103	.99	14	.90	89	.99
C	112	.90	28	.87	84	.90
CC	54	.94	44	.96	10	.92
CL	29	.93	1	-	28	.93
I	<u>16</u>	.86	<u>-</u>	-	<u>16</u>	.86
Total	536		140		396	

Property Class/Occupancy

A: Apartment (7 + units)
 R4: Apartment (4-6 units)
 RC: Residential/Commercial property (multiple-use)
 C: Commercial
 CC: Commercial Condominium
 CL: Commercial Land
 I: Industrial

CAMA SYSTEM: Valuation Process

(Computer - Assisted - Mass - Appraisal)

Perhaps the most overlooked component of the revaluation process is the CAMA system itself. Without the assistance of a computer system, no large community could expect to complete a full-scale property revaluation in a reasonable time. It is so critical, in fact, that the D. O. R. will not certify a municipal revaluation until there is evidence of sufficient computerized support for all aspects of the tax administration.

In Boston, the Assessing Department now utilizes three separate computer systems to perform the continuous functions of tax administration, property data inventory and valuation analyses.

Overview / Current Status

Since the early days of computerized tax billing, the City has used an IBM main-frame computer to store the basic tax information and produce tax bills each year. This is basically an administrative function.

Beginning in 1980-81, the Assessing Department implemented its first computerized valuation system, which is maintained on a Digital VAX 11/780 main-frame computer. Each year since its inception, the valuation system has been improved with more efficient software, or the hardware itself has been upgraded with modern equipment. We have seen a transition from the time when only the staff programmers had computer terminals, to a sophisticated network of terminals located in almost every assessor's office, all linked to the central processor.

Finally, the third computer "system", which represents the modern generation of business application, is the use of personal desktop computers (IBM "PC's"). Each unit of the Assessing Department has taken full advantage of the latest PC software available, in order to improve, streamline and expedite the work product of this Department.

Taxpayers benefit in many ways from the comprehensive use of computerization, both directly and indirectly.

- * The Assessment Information Center (formerly known as Taxpayers Assistance) can provide quick assistance to specific taxpayer needs, via on-line computer terminals.

- * Computerization accelerates the process of issuing tax bills, thus saving many thousands of dollars in interest charges.

- * Using computers, the assessing staff can produce property values that are precise and equitable, and readily certified by the Department of Revenue.

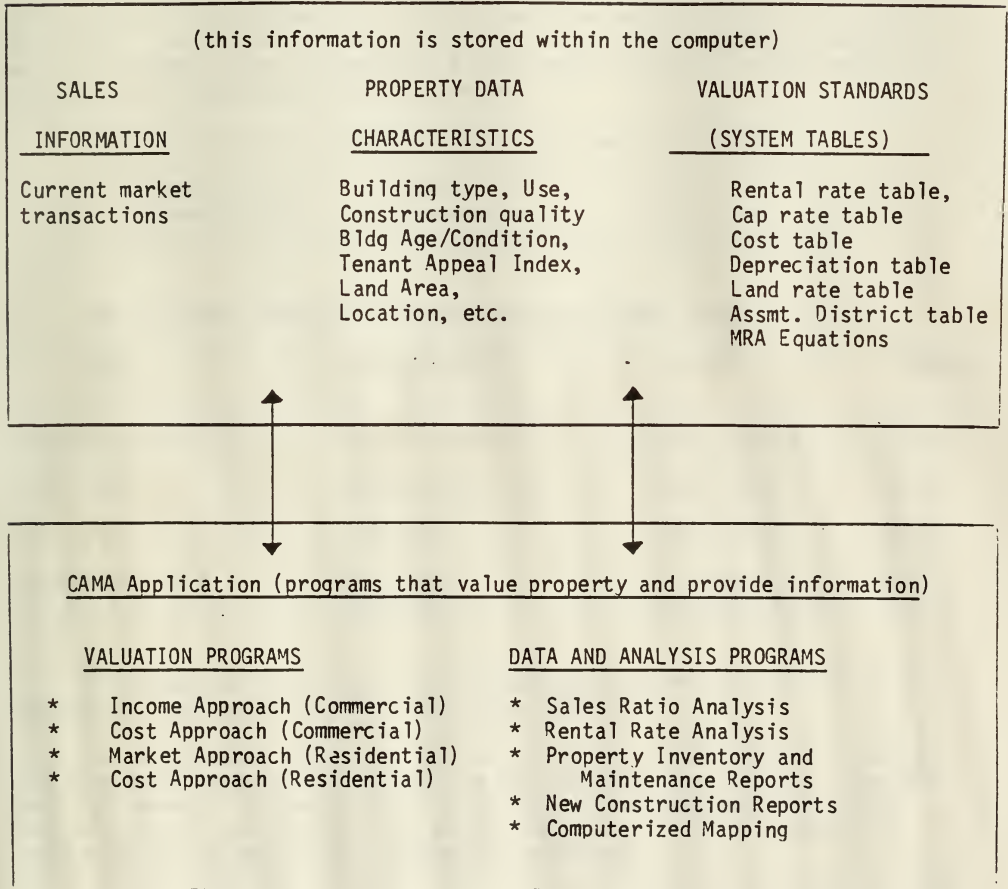
- * Erroneous data on properties can be corrected instantly, thus expediting the taxpayer hearing process as well as the tax abatement system.

- * The Assessing staff can better forecast future City revenues, which is necessary for efficient City budget administration.

CAMA Application

The CAMA system essentially includes three major components: (a) specific property data, (b) valuation standards (tables), and (c) valuation programs (software). While much of the valuation analyses (e.g. sales-ratio studies, rental rate comparison) is now conducted on individual PC's, the CAMA system itself resides on the VAX main-frame computer. The chart below illustrates in a general way how the CAMA valuation system works.

"CAMA VALUATION SYSTEM"



CAMA Application

The internal working of the computer programs is basically simple and straightforward. All of the property characteristics (data) are stored within several large files, based on property type. All commercial, industrial and apartment data is contained in a file called "CRCE", and all residential data is contained in a file called "SIGMA".

The valuation and data programs are maintained and updated by the Information Systems Unit, and when necessary, program modifications are made by the staff programmers. The data and analysis programs are run frequently in order to maintain and provide the most current information.

The commercial valuation "master" program, called "Multi-Val", allows for property valuation based on either the income method or the cost method of valuation. Residential property valuation is carried out within a packaged set of programs, which include both a cost system (similar to the commercial system) and an MRA-based modelling system.

At the core of all valuation programs is the basic formula:

Property Data Characteristic	x	Standard Unit of measure	= \$ \$ Value
---------------------------------	---	-----------------------------	---------------

The following examples illustrate how the formula works:

<u>DATA</u>		<u>UNIT MEASURE</u>		<u>VALUE</u>	<u>PROGRAM</u>
bldg area (sq.ft.)	x	rental rate (\$\$)	=	gross income	income
bldg area	x	construction cost	=	bldg value	cost
land area	x	land rate	=	land value	land
residential data	x	MRA-model unit rates	=	residential property value	MRA

For commercial valuation, the standard units of measure or "Valuation Standards" are stored in tables within the computer.

For residential valuation, however, there is a key difference. While the same basic formula is utilized, the MRA equation itself is the 'standard unit' of measure. As such, there is no table to access; rather, specific property data is applied directly to the MRA model. This is discussed in greater detail in section 2, Residential Methodology.

Final Value (Field) Review

The final field review phase of the FY 1989 revaluation consisted of the critical process of manually reviewing the property data and values on all parcels for accuracy, consistency and equity. This work was done by the appraiser staff of the Assessing Department, supplemented by nine review appraisers from the R. M. Bradley Company. The staff trainee appraisers in the department were assigned to work along with the more senior appraisers, and thus gained valuable training and experience to improve their appraisal skills and understanding.

The final field review process materials, instructions, etc., are well documented in the Field Review Manual for the FY 1989 revaluation, dated April, 1988. Some highlights of the process that led to its effectiveness are outlined in the following paragraphs.

(1) As a labor-intensive field process, the field review was carefully planned, with the same degree of detail as the overall revaluation. This planning specified the organization, work loads, staffing, review methods and materials, schedules, parcel accounting, etc., for the review.

(2) The review work and staff were organized by property types to assure maximum uniformity. The separate groups of property for review purposes were: (1) Single-family, two-family and three-family houses, plus residential land, (2) condominiums, (3) apartments, (4) commercial and industrial, (5) downtown commercial, and (6) commercial land.

(3) Realistic productivity rates (100 per day for residential and 40 per day for commercial, industrial and apartments), staffing and timetables were established, to complete the review in a three month period.

(4) Comprehensive classroom and field training was furnished to each group of review appraisers. The training focused on review methods, use of the value reference materials or guidelines, and understanding of the impact on value of changes in the major property elements.

(5) A key element in assuring effectiveness of the field review was provided by organizing and using meaningful reference materials or guidelines for the respective classes and locations of property. These included detailed records on property sales, rents for rental properties, and property listings (by ward, parcel, block) showing key data characteristics and projected values/changes for the individual parcels.

Additionally, the property record cards, block maps, property listings, and other review materials were organized into block packs to facilitate the work in the field.

(6) For the residential review, with the greater number of parcels, a pre-review process was carried out for each of the wards and among the wards, to facilitate and make the field work more pointed. The pre-review consisted essentially of analyzing values in a spread sheet format and comparative data on assessment ratios and actual value changes. It identified certain neighborhoods and model elements that needed particular attention in the review process.

Public Disclosure and Informal Hearings

The public disclosure phase of the FY 1989 revaluation is the process whereby taxpayers are notified of the new proposed values and tax impact on their properties. Taxpayers may subsequently request a review and adjustment of their new assessed value. During the informal hearings process, property owners are provided an opportunity to review and discuss their assessment with trained Assessing staff. This process occurred after the final field review but before the final certification by the Department of Revenue, and before the issuance of tax bills. After tax bills are issued, taxpayers' only recourse for assessment adjustment is through the formal appeal and abatement procedure with the Board of Review.

The public disclosure and informal hearings procedure is well documented in the New Value Public Outreach Report, which is available from the Assessing Department.

Some highlights of the process are outlined in the following:

- (1) Notification of taxpayers about their new assessed values and estimated taxes was accomplished by means of (a) newspaper releases announcing completion of the revaluation and the availability of individual value and tax information from value listings, (b) provision of value listings (with tax estimates) and Assessing Department personnel at eleven different locations throughout the city, and (c) a special telephone inquiry service.
- (2) The material available at the review sites included (a) value listings showing the property identification, owner, address, 1988 and 1989 assessed values and 1988 and 1989 estimated taxes, and (b) sale books showing the address, sale price, living area, and a picture of all residential properties that sold during 1987, sorted by ward for easy reference. A sample sale listing is shown on the following page. The value listings were furnished in three sorts: by ward and parcel number, alphabetically by street address, and alphabetically by name. With this material, taxpayers could review the values of other similar properties in their neighborhood, and also the sale price for properties that had sold during the year.
- (3) If taxpayers could not satisfy their questions through the above-described review process, they prepared a disclosure questionnaire, with which the Assessing Department staff reviewed along with the taxpayer. Appropriate action was then taken by the Assessing Department staff, calling for no change, a change based on the available information, or a further field review of the property to resolve the taxpayer's concerns. Sample copies of the disclosure questionnaire follow on the next page.
- (4) The public disclosure and informal hearings process was completed in a three-week period. There were a total of 1,041 taxpayer inquiries. The small number of taxpayer inquiries indicates that both the taxpayers and the Assessing Department acted in a very responsible manner.

PARCEL
SALE/VALUE
DATA

WARD/PRECINCT/BLOCK: 18-12-115

PARCEL I.D.: 18-11686-000

LOCATION: 109 X BEAVER ST

RESID. ASSES. DIST.: 1801

STATE CLASS CODE: 101



GRANTOR: DAMON DONALD ET AL

BOOK/PAGE: 13382 273

GRANTEE: CIANCI SUSAN

SALES DATE: 87-02-04

TOTAL AREA: 4800

SALE PRICE: \$158000

LIVING AREA: 1400

FY 89 VALUE: \$167100

SALE PRICE PER SQUARE FOOT OF LIVING AREA: \$112.86

FY89 VALUE PER SQUARE FOOT OF LIVING AREA: \$119.36

CITY OF BOSTON ASSESSING DEPARTMENT
PUBLIC DISCLOSURE DETAIL REPORT - SORTED BY HARD, STREET ADDRESS

PARCEL ID	MPB ST CL	LOCATION	OWNER	***** FISCAL '88 VALUE	***** FISCAL '88 RE TAXES	***** FISCAL '89 VALUE	***** FISCAL '89 RE TAXES	***** FISCAL '89 \$ DIFF	CL AB
01/05346/000	01/03/100 0343	246 248 SUMNER ST	ANNOS REALTY COM	126,500	N 2,739	221,000	N 4,740	2,001	
01/05345/000	01/03/100	252 254 SUMNER ST	JANA IGNATIO A	66,500	N 716	135,600	N 1,072	356	
01/05344/000	0105 01/03/100	256 258 SUMNER ST	LOPEZ JORGE I	94,500	Y 868	141,300	Y 832	-36	
01/04926/000	0105 01/03/095	264 SUMNER ST	CAMBRIA PASQUALE	81,000	Y 723	132,000	Y 759	36	
01/04856/000	0105 01/03/090	265 267 SUMNER ST	PIZZARELLA FRANK	143,500	N 1,545	83,500	N 660	-885	
01/04925/000	0105 01/03/095	266 268 SUMNER ST	OIFRONZO ANN J	84,600	Y 761	128,400	Y 730	-31	
01/04857/000	0105 01/03/090	269 SUMNER ST	OEEB CONSTRUCTIO	86,500	Y 782	145,800	N 1,153	371	
01/04924/000	0105 01/03/095	270 SUMNER ST	QUINTILIANI DONA	58,000	N 624	118,000	N 933	309	
01/04858/002	0105 01/03/090	271 SUMNER ST	TAVARES MANUEL	36,700	Y 246	51,200	N 404	158	
01/04858/006	0102 01/03/090	271 SUMNER ST	TAVARES MANUEL	62,500	Y 523	88,000	N 696	173	
01/04858/008	0102 01/03/090	271 SUMNER ST	TAVARES MANUEL	68,600	Y 589	91,400	N 722	133	
01/04858/004	0102 01/03/090	271 SUMNER ST	TAVARES MANUEL	57,700	Y 472	76,500	N 605	133	
01/04923/000	0104 01/03/095	272 SUMNER ST	PALLADINO LOUIS	70,700	Y 612	114,300	Y 619	7	*
01/04859/000	0105 01/03/090	273 SUMNER ST	TAVARES MANUEL J	87,700	N 944	104,400	N 825	-119	
01/04860/000	0105 01/03/090	275 SUMNER ST	TAVARES MANUEL	75,800	Y 667	103,800	N 821	154	
01/04920/000	0111 01/03/095	276 274 SUMNER ST	NANO ALESSANDRO	46,500	Y 351	171,500	Y 1,071	720	
01/04919/000	0105 01/03/095	278 SUMNER ST	PANZINI DOMINIC	88,700	Y 806	126,100	Y 712	-94	*
01/04861/000	0104 01/03/090	279 SUMNER ST	GALLOTTO OTTOVIA	62,800	N 676	109,900	N 869	193	
01/04918/000	0105 01/03/095	280 282 SUMNER ST	TOTISCO ARTHUR R	142,200	N 1,531	168,300	N 1,331	-200	
01/04862/000	0105 01/03/090	281 SUMNER ST	FISCHER ANGELA G	90,500	Y 825	153,300	N 1,212	387	
01/04863/000	0013 01/03/090	283 SUMNER ST	CONSILVIO FRANCHI	129,500	Y 1,485	164,500	Y 1,350	-135	*
01/04917/000	0105 01/03/095	284 SUMNER ST	GRECO PATRICK J	108,100	N 1,164	151,500	N 1,198	34	
01/04864/000	0101 01/03/090	285 SUMNER ST	TORRES RITA	58,300	Y 478	85,900	Y 394	-84	*
01/04916/000	0105 01/03/095	286 SUMNER ST	PORZIO ALFONSO A	106,100	Y 993	154,100	Y 934	-59	*

Commercial/Apartment Property

**COMMERCIAL/APARTMENT PROPERTY-PUBLIC DISCLOSURE FORM
CITY OF BOSTON ASSESSING DEPARTMENT, FISCAL YEAR 1989**

INSTRUCTIONS FOR PROPERTY OWNER: Fill out both sides of the form completely.

SECTION 1

Parcel Number: _____ Code: _____

Property Location: _____

Assessed Valuation: \$ _____

() Representative () Owner Information

Name _____

Mailing Address: _____

Daytime Phone Number: _____

SECTION 2 - Please complete the following to describe your property.

1. Have you completed an Income/Expense form for your property? () Yes () No
If not, please complete the form provided at the counter.
2. Property Type: () Apartment () Commercial () Industrial
() Commercial Condominium () Commercial Land
3. Refer to the definitions below to complete the following schedule:

DESCRIPTION

General headings of type of tenant; such as office, retail, industrial, apartment.

NUMBER OF UNITS

Refers to either the number of apartments or square footage for each major type of occupancy.

TYPE OF UNITS

Gross building area, net rentable area, New York net rentable area, studio, 1 bedroom, 2 bedroom, 3 bedroom, 4 bedroom.

MARKET RENT

The amount for which a property can reasonably be expected to rent or lease on a per unit (Apt. or Sq. Ft.) basis under current market (January 1, 1988) conditions and typical management.

RENT CONTROL

Any unit under rent control as of January 1, 1988.
Written documentation from the Rent Equity Board must be submitted to substantiate the maximum allowable rent.

<u>DESCRIPTION</u>	<u>Number of Units</u>	<u>Type of Units</u>	<u>Market Rent</u>	<u>Rent Control Units</u>

Total _____

Commercial/Apartment Continued

4. Overall Condition: ()Excellent ()Good ()Average ()Fair ()Poor
5. Number of Stories: ()Above Grade _____ Below Grade _____
6. Is the basement finished? ()Yes ()No
If yes, what percent ()25% ()50% ()75% ()100%
7. What was the last year renovations were made? _____
Dollar amount of renovations: \$ _____

SECTION 3

IT IS REQUIRED THAT PROPERTY BE ASSESSED AT THE "Full and Fair Cash Value"
AS OF JANUARY 1, 1988, PURSUANT TO MASSACHUSETTS GENERAL LAWS, CHAPTER 59.

1. What do you consider is the "Full and Fair Cash Value" of your property?
\$ _____
2. On what factors do you base your value?
()Judgement ()Recent Appraisal ()Selling Price
()Recent Offer ()Asking Price ()Comparable Sales
()Other: (Explain) _____
3. Is the objection based upon inequality or over valuation compared to other
properties in the area? _____
If so, list the comparable properties.
1. Owner: _____ Address _____
Parcel Number _____ Assessed Valuation \$ _____
2. Owner: _____ Address _____
Parcel Number _____ Assessed Valuation \$ _____
3. Owner: _____ Address _____
Parcel Number _____ Assessed Valuation \$ _____
4. Owner: _____ Address _____
Parcel Number _____ Assessed Valuation \$ _____

Residential Property

CITY OF BOSTON ASSESSING DEPARTMENT, FISCAL YEAR 1989

PROPERTY PUBLIC DISCLOSURE QUESTIONNAIRE

INSTRUCTION TO PROPERTY OWNER: Fill out this side of the form completely.

SECTION 1

Parcel Number: _____ Code: _____

Property Location: _____

Assessed Valuation: \$ _____

Owner Information: Name _____

Mailing Address: _____

Daytime Phone: _____

SECTION 2 - Please complete the following to describe your property.

1. Property Type: ☐ Single Family ☐ Two Family ☐ Three Family
 ☐ Condominium ☐ Residential Land ☐ Other _____
2. Style: ☐ Ranch ☐ Raised Ranch ☐ Split-Level ☐ Bungalow ☐ Cape
 ☐ Colonial ☐ Victorian ☐ Tudor ☐ Contemporary
 ☐ Decker ☐ Duplex ☐ Rowhouse ☐ Other _____
3. Overall Condition: ☐ Above average for neighborhood
 ☐ Average for neighborhood ☐ Below average for neighborhood
4. Total number of rooms (excluding baths and closets): _____
 Number of Bedrooms: _____ Number of Baths: _____
 Number of Halfbaths: _____ Number of Kitchens: _____
5. Is the attic finished? ☐ Yes ☐ No
 If yes, what percent? ☐ 25% ☐ 50% ☐ 75% ☐ 100%
6. Is the basement finished? ☐ Yes ☐ No
 Is yes, what percent? ☐ 25% ☐ 50% ☐ 75% ☐ 100%
7. What is the story height of the dwelling? _____
8. What was the last year renovations were done? _____

SECTION 3

IT IS REQUIRED THAT PROPERTY BE ASSESSED AT THE "Full and Fair Cash Value" AS OF JANUARY 1, 1988, PURSUANT TO MASSACHUSETTS GENERAL LAWS, CHAPTER 59.

1. What do you consider is the "Full and Fair Cash Value" of your property?
2. On what factors do you base your value?
 ☐ Judgement ☐ Recent Appraisal ☐ Selling Price
 ☐ Recent Offer ☐ Asking Price ☐ Comparable Sales
3. Is the objection based upon inequality or over valuation compared to other properties in the area? _____ If so, list the comparable properties.

	<u>Ward/Parcel</u>	<u>Address</u>	<u>Assessed Value</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

Residential Property

RESIDENTIAL PUBLIC DISCLOSURE FORM
CITY OF BOSTON ASSESSING DEPARTMENT, FISCAL YEAR 1989

No: _____

PID: _____ LOCATION _____

Interviewed by: _____ Date: _____

NATURE OF COMPLAINT:

RECOMMENDED ACTION:

- | | |
|---|--|
| <input type="checkbox"/> No Action (NA) | <input type="checkbox"/> Field Review - no verification by owner needed (FE) |
| <input type="checkbox"/> Office Check/Change (OC) | <input type="checkbox"/> Field Review - with interior inspection (FI) |
| <input type="checkbox"/> Other (OT) | <input type="checkbox"/> No Show (NS) |
| | <input type="checkbox"/> No Hearing (NH) |

ACTION TAKEN:

Old Values: _____ New Values: _____

- NC() No Change
SC() Size Change (Bld)
DC() Data Change
CC() Class Change
CF() Condition Factor
LU() Land Use
SV() Sound Value
AC() Adjustment Code

REASON FOR ACTION:

BY: _____ ID: _____ DATE: _____

CHANGE APPROVED:

By: _____ ID: _____ DATE: _____

DOCUMENT PROVIDED _____ (y/n) DOCUMENT ATTACHED _____ (y/n)

DATA ENTERED:

BY: _____ Date: _____ Verified: _____ Date: _____



Commercial Property

COMMERCIAL/APARTMENT PUBLIC DISCLOSURE FORM
CITY OF BOSTON ASSESSING DEPARTMENT, FISCAL YEAR 1989

No: _____

PID: _____ LOCATION _____

Interviewed by: _____ Date: _____

NATURE OF COMPLAINT:

RECOMMENDED ACTION:

- ☐ No Action (NA) / ☐ Field Review - no verification by owner needed (FE)
☐ Office Check/Change (OC) ☐ Field Review - with interior inspection (FI)
☐ Other (OT) ☐ No Show (NS)
☐ No Hearing (NH)

ACTION TAKEN:

Old Values: _____ New Values: _____

- NC ☐ No Change
SC ☐ Size Change (Bld)
DC ☐ Data Change
CC ☐ Class Change
CF ☐ Condition Factor
LU ☐ Land Use
SV ☐ Rent Control
TA ☐ Tenant Appeal

REASON FOR ACTION:

BY: _____ ID: _____ DATE: _____

CHANGE APPROVED:

By: _____ ID: _____ DATE: _____

DOCUMENT PROVIDED _____ (y/n) DOCUMENT ATTACHED _____ (y/n)

DATA ENTERED:

BY: _____ Date: _____ Verified: _____ Date: _____



FY '89 PROPERTY REVALUATION

SECTION 2: VALUATION METHODOLOGY

RESIDENTIAL

Neighborhood Delineation

Multiple - Regression Analysis: Description

The Fiscal Year 1989 Project

General Approach

Residential Modelling

Condominium Modelling

Modelling Accuracy



Residential Revaluation Process

Neighborhood Delineation

It is well known that the value of a real estate property is dependent upon both structural characteristics and physical surroundings, i.e., its neighborhood. One of the first steps in any citywide revaluation is to analyze the residential neighborhoods and communities of Boston, and to properly define the boundaries that distinguish one neighborhood from another.

Although not easily defined, neighborhoods may be part of a larger community or may be an entire community. This is dependent upon the characteristics and interests that attract the inhabitants; in actuality, every city began as a neighborhood or as a small community.

In this analysis, we have considered factors believed to be pertinent to what constitutes the one hundred-plus residential neighborhoods of Boston, more commonly known in the Assessing Department as "Residential Assessment Districts". As noted in the American Institute of Real Estate Appraisers, The Appraisal of Real Estate, pg. 95, "An understanding of neighborhood trends and their influence on value involves considering the relevant physical, social, economic, and governmental factors."

Those "factors", which we have focused upon, include:

- PHYSICAL
 - relation to the remainder of Boston
 - street patterns and widths
 - convenience to public transportation
 - quality of and convenience to stores, service establishments, parks, and recreation areas.
 - lot sizes
 - geographical and topographical features
 - nuisances and hazards, e.g., heavy traffic, industrial noises and vibrations.
- SOCIAL
 - density of population
 - strength and identity of neighborhood organizations
- ECONOMIC
 - median sale prices and assessed land values
 - degree of homeownership
 - rent and income levels
 - amount of vacancies and vacant land
 - new construction and rehabilitation
 - growth and changing use.
- GOVERNMENTAL
 - zoning
 - subsidized housing
 - special assessments
 - regulations restricting design or use

Neighborhoods are always changing, although the rate of change varies, and the changes themselves may not be easily noticeable. Furthermore, residential neighborhoods are often more flexible than their commercial and industrial counterparts. Boston's assessment districts are indeed dynamic; a growing tolerance and preference for heterogeneity within them exists, and "obsolete standards for conformity have no place in modern neighborhood analysis." *

* The Appraisal of Real Estate, American Institute of Real Estate Appraisers, 7th edition, 1979, p. 91

METHODOLOGY USED: MULTIPLE REGRESSION ANALYSIS

As in Fiscal Year 1986, multiple regression analysis (MRA) was the principal technique used to value Boston's residential property, including condominiums. The main advantage of using MRA as a valuation method is twofold. First, final value estimates are derived straight from the local market, and are usually quite close to the actual selling price of properties. Second, values can easily be updated each year based on the most current market information available.

Regression analysis is commonly used in real estate to generate "models" or mathematical equations for mass appraisal purposes. These models are a specialized application of appraisal theory. In contrast to the fee appraisal, which is a systematic approach for collecting and analyzing data in order to produce reasonable value estimates for one property, regression-based mass appraisal effectively accomplishes the same thing for a large group of properties. This method uses a model that is a mathematical representation of the current housing market (as reflected by sale prices).

Typically, there are several steps involved in the modelling procedure. First, all current sales data and property characteristics are entered into the computer. Next, the analyst (model builder) can either set up a "trial" model, by first assigning specific dollar amounts to property characteristics (e.g. location, land value, etc.), or allow the computer program to generate its own "original" model based on the sales data. In either case, the MRA program is then used to test and refine the original model. The results are carefully scrutinized after each run of the program (called "iteration"), with modifications being made by the analyst, and the process is repeated. Each repetition of the process is designed to narrow the gap between the computerized value estimates and the actual selling prices of homes.

Also known as Least Squares Analysis, MRA develops a "model" of the actual real estate market by searching for consistent patterns in the relationship between selling prices and property characteristics of the homes being sold. A simplification of this type of analysis would be to estimate the value of a fireplace by taking the difference between the average selling price of homes with and without fireplaces. The MRA model, in its completed format, is meant to predict the fair market selling price of a property, based on the significant characteristics of that property. This typically includes location, living area, building style, age and condition, exterior finish, etc. In a mathematical sense, this model is designed so that a proper combination of the dollar value(s) assigned to each significant characteristic produces the smallest error between the historic actual selling prices and the values produced by the model. A detailed description of the MRA process along with examples follows next.

Multiple Regression Analysis: A description

At this point it is appropriate to examine the MRA model itself, which is basically a straightforward mathematical formula or equation. Although "MRA" stands for "multiple regression analysis", the core of the technique is a simple process called "linear regression". Linear regression is used to define in statistical terms the relationship between a KNOWN (or given) variable and an UNKNOWN (or dependent) variable.

Using linear regression, the value of the unknown variable is able to be predicted based on the value of the known variable.

For example, if a selected group of houses were all identical except for one feature - size (living area) - then we might reasonably expect selling prices would vary directly according to the amount of living area within the house. With a sufficient number of sales to use as a sample, we can develop a simple formula that will estimate the selling price of a house, based solely upon its living area. The following table contains sales data for a small sample of houses.

(TABLE 1)

SALES SAMPLE	SALE PRICE	SIZE (sq. ft.)	UNIT OF COMPARISON (\$\$/sq. ft.)
House #1	\$120,000	1400	\$85.71
House #2	\$160,000	2000	\$80.00
House #3	\$170,000	2400	\$70.83
House #4	\$144,400	1900	\$76.00
House #5	\$136,000	1800	\$75.56
House #6	\$132,000	1500	\$88.00
House #7	\$185,000	2800	\$66.07

A relationship between the living area and selling price of a house can be observed by analyzing the sample data. It is obvious that the larger the size, the greater the selling price. Also, as with most economies of scale, when the selling price is expressed as \$\$/sq. ft., it can be seen that as the sq. ft. size increases, the sq. ft. value (\$\$/sq. ft.) decreases. Compare 1400 sq. ft. at \$85.71/s.f. to 2800 sq. ft. at \$66.07/s.f. Thus, the selling price is the dependent (unknown) variable that varies directly according to the given (known) variable of living area. The fact that an unknown value can be predicted or even explained based on known data is the key to any regression analysis, no matter how complex.

In this hypothetical example, the following relationship is true:

Sale Price = Living Area x Unit of Comparison

\$144,400 = 1900 sq. ft. x \$76.00 (House #4)

This can be written as:

[Dependent Variable = Known Variable x Coefficient Value]

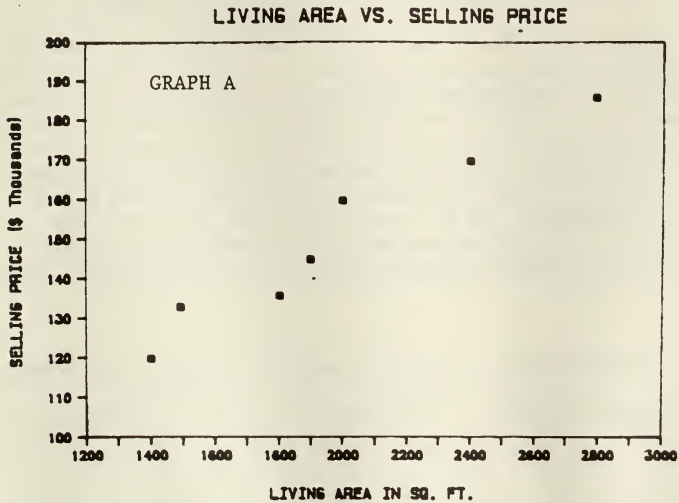
The unit of comparison (\$76.00) is called the "coefficient" of the known variable (the living area). The coefficient is thus the precise link between the known variable and the estimated value of the dependent variable. In this example, the amount of living area (1900 sq. ft.) is qualified by the coefficient value of \$76.00 per sq. ft. in order to arrive at the value of \$144,400.

The known variable is sometimes referred to as the "explanatory" variable, since it obviously serves to explain the dependent variable (selling price). Note how this equation, which is the foundation of a more complex model, is actually used in two ways: to explain, and to predict value. First, the right hand side of the equation (1900 s.f. x \$76.00) explains the selling price of \$144,400, which was in fact an actual sale price. The model is constructed (derived) using current market transactions. Second, once the model is constructed via the regression process, it is then applied to unsold properties, as a tool to "predict" or estimate the fair market value of each property.

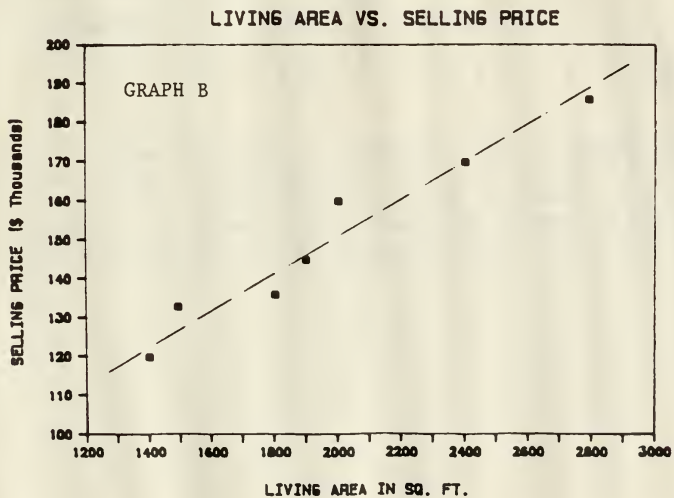
From Table I we see that the sales data ranges from a low of \$66.00 to a high of \$88.00 per sq. ft., with an average or middle value being \$76.00. Remember that the objective of regression analysis is to accurately predict the value of all houses, based on the given criteria. Therefore, it is not adequate to simply use the average value (\$76.00) as a coefficient, since it wouldn't accurately reflect the sale prices of the smallest or the largest houses. For instance, House #1 in the sample sold for \$120,000, but if the model simply applied a coefficient of \$76.00 to the living area of 1400 sq. ft., then the selling price would be estimated at \$106,400 rather than \$120,000.

This would imply that if a model is to accurately forecast a selling price in all cases, then the proper coefficient value will have to possess a "variable" nature, so that the extreme ends of the data range as well as the mid-range are satisfied. Regression analysis provides us with a solution.

Let us examine how a true coefficient is determined using regression analysis. If the sample data is plotted on a "scatter" diagram or graph, it will look like graph (A) below. Each point represents the intersection of a sale price and a living area.



The relationship between sale price and living area shows up on the graph as a distinct pattern which can be represented by a straight line (hence the term "linear" regression). Graph (B) illustrates this line.



This line is mathematically represented by an equation, which is technically expressed as "Y = MX + b". The computer process of plotting (calculating) the line that "best fits" the data is called regression analysis. It is a simple comparative process that repeatedly measures and tests the distance between each data point and the line itself, until the absolute best-fit line is established.

The slope (angle) of this "best-fit" line actually represents the optimum coefficient value which will be used in our equation. As stated previously, the coefficient value is the link between the known variable (living area) and the dependent variable (selling price). The reason that this coefficient will now work for each and every house, including extreme sizes, is because the coefficient value now represents a continuous line, rather than a single point. Each point along this line is the precise intersection of two variables: both the known and the dependent variables.

Thus far, we have described linear regression by using a single given (known) variable: living area. In our hypothetical example, the formula was simply:

$$\begin{aligned} \text{[Dependent Variable]} &= \text{Known Variable} \times \text{Coefficient} \\ \$144,400 &= 1900 \text{ s.f.} \times \$76.00 \text{ (House \#4)} \end{aligned}$$

With regression analysis, this formula now becomes the equation of the best-fit line (as shown on Graph B), but it is essentially the same formula.

$$\begin{aligned} \text{Selling Price} &= \text{Coefficient} \times \text{Known Variable} \\ \$144,400 &= [\$ 76] \times [1900 \text{ s.f.}] \\ Y &= [M] [X] + b \end{aligned}$$

The "b" is a number, known as a "constant", that is always present in the equation. On a graph it represents the point of origin of the line (along the Y-axis of the graph). In the real-life valuation models, the b-constant represents a numerical value that stands alone, not related to any given variable. It has meaning only within the model itself, and is not based on any market value.

Using our selected sample of 7 sales, the best-fit line (Graph B) is mathematically expressed by

$$\begin{aligned} [Y] &= [M] [X] + b \\ \text{Sale Price} &= [51.2] \times [\text{s.f. area}] + \$47,120 \end{aligned}$$

This formula is demonstrated to be correct when actual sample data is used. Sample House #4 has 1900 sq. ft.; 1900 is therefore entered as the known variable (X).

$$\text{Sale Price} = [51.2] \times [1900] + \$47,120$$

$$\text{Sale Price} = \$144,400$$

(\$144,400 is obtained when 51.2 is multiplied by 1900, and then added to \$47,120.)

Keep in mind that while the complete formula will predict a market value, the specific coefficient value(s) and the constant value within this equation should not be (and cannot be) related to "real life" market value numbers. These are mathematical terms that only relate to the equation of a line. For this reason, it is difficult to explain or interpret the individual details of a regression model by way of using familiar market values as a basis for comparison.

Another example:

If a house has 2800 sq. ft., then 2800 is entered as the known variable, and the selling price is then estimated to be \$190,480.

$$\begin{aligned} Y &= [M] [X] + b \\ &= [51.2] \times [2800] + \$47,120 \\ &= \$190,480 \end{aligned}$$

Although House #7 in the sample has 2800 sq. ft. and sold for \$185,000, the regression formula has estimated the value to be \$190,480. Remember that the regression formula is based on the line that "best fits" all of the sample data, and realistically cannot be expected to match individual sale prices perfectly. However, the predicted value estimates can be considered reliable if there is, first, confidence in the sample data (e.g. the sales are arms-length and the property data is accurate), and second, confidence in the model itself (e.g., statistical measurements show a minimum degree of "error" or unexplained variance between the model and the sample sales).

Multiple Regression Analysis

Our example thus far has dealt with a hypothetical situation: identical houses except for a single variable (size). In the real marketplace, however, there are many significant "given" variables that are known to affect the selling price of a property. Every buyer of real estate has his/her individual reasons for buying a property, and the motivational reasons may vary considerably. Indeed, within a given price range, buyer preference for neighborhood location is perhaps the most significant factor, possibly followed by size, age/quality/condition and house style (e.g. ranch, cape, colonial).

Since each one of these factors will usually influence sale prices to some degree, it is only logical to include them in our model.

At this point we introduce the process called Multiple Regression Analysis. Until now we've discussed simple linear regression. Essentially, the only difference between simple linear and multiple regression is the number of known (given) variables that are used to explain or predict the unknown (dependent) variable.

When regression analysis is used, each variable is tested (or "regressed") against sales prices, in order to determine the impact of that particular variable on the market. (In other words, to what extent does each variable influence the sale prices?) The amount of direct positive correlation (or strength) of each variable is statistically measured, which lets the analyst (model-builder) know which variables should be included in the final model. It is at this point that the simple formula we started with:

(Dependent Variable = Known Variable x Coefficient)

$$\text{or } [Y = MX + b]$$

has to be expanded to account for all significant variables. Therefore, the expanded formula (or model) becomes:

$$\begin{array}{ccccccc} \text{Selling} & = & \text{Neighborhood} & + & \text{Living} & + & \text{Age/Quality} & + & \text{Style} & + & \dots \\ \text{Price} & & \text{Factor} & & \text{Area} & & \text{Condition} & & & & \end{array}$$

which is expressed as:

$$(\text{Dependent} = [\text{Known x Coeff}] + [\text{Known x Coeff}] + [\text{Known x Coeff}] + \dots + \text{Constant})$$

Variable Variable Variable

$$[Y = MX + MX + MX + b]$$

The process is now called Multiple Regression analysis, since the dependent variable is now explained (predicted) by multiple known variables, rather than a single variable.

When interpreting a multiple linear regression, one must bear in mind that real world variations often alter the expected coefficient results, as well as the expected relationship between the explanatory variables and actual sale prices. These occur because of the added complexities of using many variables, the effects of variables that overlap (called "collinearity"), and inconsistent variations in the data itself. These "results" are, again, the dollar amounts of each feature (or explanatory variable) that the model determines.

Using sales as data, the model compares all the sales prices and all the explanatory variables of the houses, and discovers the significant similarities among this data.

For illustrative purposes, consider the following example: a property is a 10-year old Cape-style house, located in a desirable neighborhood. It is brick-sided, has 3000 square feet of living area, and has 3 bedrooms. Each variable is described as follows within the model as follows:

X1 = neighborhood; X2 = living area (sq. ft.); X3 = style; X4 = house exterior; X5 = number of bedrooms; X6 = age in years.

After the regression analysis, the completed model might look like this:

$$Y = \$40,000 (X1) + \$10 (X2) + \$20,000 (X3) + \$15,000 (X4) + \\ \$10,000 (X5) - \$1,000 (X6) + \$25,000$$

The value of each explanatory variable is multiplied by a corresponding per-unit rate (the coefficient value) to obtain its specific contribution to the estimate of sale price.

For the sample property, the model would allocate the dollar value as follows:

$$\text{Sale Price} = \$40,000 \times (1.25) + \$10 \times (3000 \text{ Sq. Ft.}) + \$20,000 \times (1.0) + \\ \$15,000 \times (1.67) + \$10,000 \times (3 \text{ bedrooms}) - \$1,000 (10 \text{ yrs.}) \\ + \$25,000.$$

This equation can be interpreted as: the estimated selling price of a house is equal to the summation of the following: \$50,000 for a house lot in a neighborhood which is determined to be 25% more valuable than the average neighborhood; plus \$30,000 for the square feet of living area; plus \$20,000 for an average style; plus \$25,000 for an exterior siding which is determined to be 67% more valuable than the average siding; plus \$30,000 for three bedrooms; less \$10,000 for its age; plus \$25,000 for other factors not included in the equation but nevertheless contribute to the estimate. The sum of these products is therefore \$170,000.

The regression technique, through its iterative process of finding consistent patterns between "dollars and data" among sale properties, produces a mathematical model. The model determines the home's estimate of value by summing all the individual contributions to value. Again, the coefficients in this or any regression equation are meaningful only in relation to the whole regression equation.

Once the model is working satisfactorily (based on the sample sales), the regression equation can then be applied to all properties in the community to estimate their market values.

To indicate the success achieved using this method of data analysis, several statistics are produced during the MRA process that measure:

- how well a property's sale price is estimated,
- how statistically important each independent variable is toward explaining the sale price, and
- how efficiently and accurately the overall MRA technique has performed.

In addition, the Massachusetts Department of Revenue requires that the results of this methodology should meet another constraint, namely the "coefficient of dispersion" (C.O.D.). The coefficient of dispersion is the average percentage by which individual assessment ratios deviate from the median (or mean) assessment ratio. This numeric value is not overly sensitive to extremely high or extremely low values, and as such it is a good measure of overall assessment equity. It is calculated as the average absolute deviation from the mean (or median) value of the sales ratios, and then divided by this same mean. The certification standards of the Department of Revenue require the C.O.D. for the R1, R2 and R3 classes to be approximately 10% (or less) in order to be acceptable. In other words, the C.O.D. is another measure of the accuracy of the overall results, and a C.O.D. of 10% (or below) indicates a relatively high standard.

THE FISCAL YEAR 1989 PROJECT

GENERAL APPROACH

There are two general categories of regression models. These are "multiplicative" and "additive" - both were used in this year's revaluation.

A simple multiplicative model might appear as:

Preliminary value estimate = size adjustment + location adjustment
+ age adjustment + quality adjustment
+ constant

In this case, MRA would analyze sales to determine the percentage adjustments needed to reflect variation in size, location, age, and quality, and then select a constant term which accounts for other factors not included in the equation and therefore equate the overall model's average estimate with the average sale price.

A simple additive model used in conjunction with this multiplicative model might look like:

Final value estimate = preliminary value estimate + condition adjustment
+ fireplace adjustment + bathroom count adjustment
+ constant

Here MRA would analyze sales again to determine a dollar value for condition, fireplaces, bathrooms, and then select a constant term so that the average final value estimate will equal the average sale price.

An important part of this process is defining terms like "fireplace adjustment" in detail. For example, the value of a fireplace is different for a home on Beacon Hill than one in West Roxbury. To reflect this, we might include a location multiplier in our definition of "fireplace adjustment"; this would have the effect of more accurately valuing fireplaces in these two distinctly different areas. As such, appraisal input is still necessary when defining the components of a model that is highly computerized.

RESIDENTIAL MODELLING

Unlike FY'86, where 5 geographical modelling regions were defined and employed, the FY'89 revaluation successfully captured the locational influences of Boston's diverse neighborhoods through a ranking of its over 100 assessment districts. As such, a two stage process was employed. The first involved the calculation of a citywide "control model" which estimates sale price based on the known, most fundamental contributors to residential value. These contributors were arrived at through appraisal judgement of the most important items that influence value, including the location or neighborhood factor. This is basically a multiplicative model. The following data items comprise the framework for this global model:

- neighborhood
- grade
- age
- date of sale
- building style
- property type
- living area

The second stage was the calculation of a "main model" which included the estimate derived from the control model as an independent variable and further refines the final estimate of a property's value. Unlike the control model which essentially used multiplicative terms, the main model's refinement was executed through percentage and additive adjustments. These items were again selected from appraisal judgement and tested against sales for their appropriateness.

The following data items comprise the framework for this model:

- general estimate of value as calculated from the control model
- street type
- exterior finish
- interior condition
- overall condition
- view quality
- foundation
- roof material
- kitchen style
- heat type
- interior finish
- total fixtures
- off street parking
- fireplaces
- garage
- porch

It should be noted here that the coefficient value of each of these terms evolves from estimating value as best we can without one of these terms, and then determining how much new information this same term contributes through another implementation of the model. Finally, this information is compared with the amount of error this term eliminates from the original results. If error is decreased significantly, then it makes sense to include this term in the model.

LAND VALUES

Because of relatively little variation among residential lot sizes and because of limited locational data within a given assessment district, a detailed analysis of each district was undertaken by the department appraisal staff. Maps of the assessment districts were upgraded to include what were defined as standard lot sizes for each district and, if necessary, subdistricts. These standard lot sizes were arrived at by taking the mean size of all residential properties in the particular district.

Subdistricts were identified if they displayed significantly different average lot sizes and value influences from the remainder of the assessment district. These subdistricts were in turn added to the overall residential database, thus expanding the Department's capability to effectively value land.

Essentially, two criteria were established in order to arrive at reasonably accurate land values for Boston's heterogeneous neighborhoods. These are:

- (1) Land value + building cost value = sale price for improved property
- (2) Land value/total value = target "reasonable" range.

COST TABLES

When the FY'86 revaluation was implemented, Sigma Systems Technology utilized information from the Marshall & Swift Valuation Service in order to arrive at schedules for general building costs in the City of Boston. These costs were updated for FY'89 in order to more accurately reflect the active Boston real estate market. As such, the desired level for the land-to-total value ratio was preserved since cost is an integral part of this term. Using these updated cost tables, land residuals were analyzed and base land rates were developed. These in turn were reviewed by the assessor/appraisal staff and further refined based upon their recommendations.

SPECIAL IMPROVEMENTS

Typically, these items include swimming pools, tennis courts, jacuzzis, etc. Because they occur too rarely to warrant analysis, such terms were valued by adding their cost calculated values to the final values after review by the assessor/appraisal staff.

CONDOMINIUM MODELLING

As with residential modelling, a two stage process was used to value condominiums. Stage 1 was a multiplicative model which derived a general estimate that considered the following explanatory terms:

- living area
- effective age
- number of bedrooms
- time adjustment
- neighborhood
- base floor
- style
- grade
- condominium appeal rating (C.A.R.).

Stage 2 was an additive model which focused on the individual units; it included terms which are percentage adjustments to the Stage 1 estimates as well as dollar amount add-on adjustments.

The following data items comprise the framework for this model:

- orientation
- extra bath fixtures
- bath style
- air conditioning
- good view (certain neighborhoods)
- fireplace
- pool, tennis courts
- roof deck
- other decks
- interior condition
- deeded parking spaces
- bedroom adjustment
- kitchen type
- large units
- additional size adjustments

It was observed that more than one condominium market exists; this implies that there are more than one set of consumer demands to be identified and measured through the MRA process. By testing various factors, building style was discovered to be the best index of market segmentation. As a result, when styles such as decker, duplex, row end, row middle, free-standing and townhouse are separated from conventional apartment styles such as low-rise, mid-rise, etc. the measurements of model performance improve markedly for both groups.

Therefore, these two distinct groups were separated; each having its own Stage 1 and Stage 2 models.

As alluded to, a new term was introduced into the FY'89 Revaluation process: the condominium appeal rating (C.A.R.). This was derived by rating condominium mains in each neighborhood from a low of 1 to a high of 9 based upon recent sales data. Each condominium main building was assigned a separate C.A.R. which was added to each Stage 1 model. This added term, similar to a commercial property's Tenant Appeal Index, focused on a Condominium Main's relative market appeal and served to contribute significantly to the model's ability to explain value.

MEASUREMENT OF MODELLING ACCURACY

Among other descriptive statistics, the Department of Revenue requires that the regression reports include the aforementioned coefficient of dispersion as well as the coefficient of determination, i.e., R squared. This statistic, which is expressed as a percentage, reflects the amount or percent of differences among sales that is explained by the model or, alternatively, how well the combination of independent variables explain differences in the dependent variable, sale price.

These statistics that reflect model accuracy and effectiveness were reported before the field review, and were slightly improved after the final review adjustments. The modelling statistics for the residential (R1-R2-R3) and condominium properties were as follows, which indicate a high degree of quality.

	<u>Coefficient of Dispersion*</u>	<u>Coefficient of Determination</u>
Residential	10.37	0.914
Condominium	11.69	0.9019
Condominium Non-Conventional	11.32	0.9032

It should be noted, also, that the Department is primarily concerned with developing models that contain those significant factors that assessors observe through exposure to Boston's unique markets. If such factors were omitted for any reason as a term in the final model, then, at that point, statistical problems were addressed in an effort to include these factors. As a result, this approach led to a better intuitive understanding of the model's terms, a model that was easier to explain, as well as an improvement in statistical accuracy.

IMPROVEMENTS SINCE FISCAL YEAR 1986 REVALUATION

Perhaps the most significant change since the previous revaluation has been the simplification of the number of models. Instead of five regional models for both residential and condominium properties, only two models: (one control and one main model) were employed for residential while two controls and two mains were utilized for condominiums. Although the statistics which measure accuracy were not significantly different from the prior revaluation, it was discovered that the current approach and its models were easier to communicate and explain to assessors as well as to the layman.

* These figures based on final models, were found acceptable by the Department of Revenue.

FY'89 PROPERTY REVALUATION

SECTION 3: VALUATION METHODOLOGY

COMMERCIAL

Valuation Process

Income and Expense Data

Money Market Rates

Capitalization Rates

Central Business District

Current Market Sales Analysis

Commercial Cost System

Commercial Land Valuation

SECTION 3: VALUATION METHODOLOGY

COMMERCIAL - INDUSTRIAL - APARTMENTS

Commercial Property: The Valuation Process

In the Boston CAMA system, commercial property actually includes all income producing property, including the following land uses:

- C: Commercial (retail, office, service, etc.)
- I: Industrial (manufacturing, distribution, etc.)
- A: Apartment: includes 7 or more units
- R4: Apartment: includes 4-6 units
- RC: Residential/Commercial property (multiple-use building)

The two chief methods of valuing commercial property are the income approach and the cost approach to value. However, the income approach is the primary method used by appraisers and assessors to value income-producing property.

The steps in the Income and Cost Approaches to value are briefly outlined here:

<u>Income Approach</u>	<u>Cost Approach</u>
Effective Gross Income	Cost of Improvements
- Operating Expenses	
= <u>Net Operating Income</u>	+ <u>Site Value</u>
÷ Capitalization Rate	
= Property Value	= Property Value

Since real estate values are constantly changing according to a wide range of factors in the economy and the marketplace, the income approach is particularly well-suited to estimate property value. This method identifies, measures and utilizes those economic factors and forces that determine real estate value. These factors, which include income levels, investment expectations and certain financial elements (e.g. interest rates) often fluctuate from year to year.

Use of the income approach typically involves the following major steps, which were carried out during the FY'89 revaluation.

- (1) Collect income expense information from a variety of reliable sources, and establish a new set of "standard" rates (aka "valuation standards") for each major property type, and for each of the 57 Commercial Assessment Districts in the City.
- (2) Review and measure changes in the capitalization rate elements including interest rates, return on equity, effective tax rate, investment holding period, market appreciation and other financial factors. Compare any resultant changes in estimated capitalization rates with similar data from industry published sources.
- (3) Once all of the new rates are in the CAMA system, calculate a new set of values, and test them against the current market.

These steps are discussed in detail in the following sections of this report.

Income and Expense Data

Current information on rents, expenses and vacancy rates for Boston is obtained from multiple sources. These include our own files of income and expense data, compiled each year from information submitted by property owners, as well as published surveys from local real estate companies such as Spaulding & Slye, Leggat McCall, Meredith & Grew, Cushman & Wakefield and the New England Real Estate Directory. Specific data was also obtained from the Building Owners and Managers Association (BOMA) and the Institute of Real Estate Management (IREM), two nationally-recognized organizations that analyze income and expense data for every large metropolitan area in the country.

According to these published reports, which track data on specific buildings in downtown Boston from year to year, rent increases during 1985-1987 were reported in the range of 6% to 14%, with a median increase of approximately 10%.

The national surveys of BOMA and IREM report rent increases for Boston during 1986 to be in the range of 5-6% for office space alone, and 8-10% for total income, including rents for retail space, parking and miscellaneous income.

Building operating expenses, which are analyzed and measured by BOMA and IREM, have also risen, but have remained constant as a percentage of gross income.

The "Real Estate Report", published quarterly by the Real Estate Research Corporation, (Chicago, Ill.) confirms annual growth rates for office income and expenses to be in the 4% to 5% percent range during the period from late 1985 through the 1st quarter of 1987.

Although vacancy rates have generally stabilized in the greater Boston market during the past 1-1/2 years, the absorption rate in downtown Boston has remained strong, resulting in a slight decline in the vacancy rate during 1986. However, the amount of new construction currently in progress in downtown Boston has kept asking rental rates for new space at relatively stable and constant levels.

The previously mentioned surveys usually focus on the larger properties that are located in the central business district of the City, and describe the current market rental experience of certain properties. In order to collect income and expense information on all commercial property, including the outlying areas, several other methods were used during the revaluation. These included the field review of all property, the income-expense forms which are submitted by property owners, and the inspection of all sales that occurred during 1986 and 1987.

The results of the data-collection process have been stratified first by major property type (office, retail, industrial, apartment) and second, by commercial assessment district. The Appendix of this report (exhibit com-3) contains a sample of the market information that has served as a basis for the Boston FY'89 valuation standards. All market data is also categorized according to the "tenant appeal index" (T.A.I.) rating that is assigned to the property. The complete description of the T.A.I. rating system is included in the Appendix, as exhibit com-5.

A sample page of the actual income-expense tables that are part of the FY'89 CAMA system is also included in the Appendix, as exhibit com-4.

Income and Expense Tables

Property Location, tenant appeal index and occupancy class define a three dimensional matrix for income and expenses. By locating one cell within the matrix, a homogeneous group of properties are defined. This group of properties is in the same location, has the same appeal to tenants, and is occupied for the same purpose (office, retail, etc.). In effect, these properties are in the same market and are subject to the same external forces.

By defining a cell within this matrix, we define the appropriate economic rents, expense levels, and capitalization rates, necessary to estimate the income approach value of a property within a cell. This method results in the accurate and consistent valuation of all types of commercial and industrial property using the income approach to value.

Within the CAMA system, there are four occupancy class groups: retail, office, industrial and special purpose. Ten location groups have been defined from the commercial neighborhoods to create a matrix with 40 cells.

Occupancy Class Groupings - The occupancy class is simply the current use of the property.

Occupancy classes can be broken into major groups and subgroups. This allows the system to aggregate uses to include all retail, all office uses, etc.; or separate these major groups into smaller subgroups such as discount store, department store, etc.

Location Groupings - The City of Boston has been divided into 10 commercial location groups which represent an aggregate of 57 individual commercial neighborhoods. Neighborhood divisions are based primarily on property types and characteristics, with specific boundaries being of a physical nature, i.e. highway, river, etc., or based on a change in market area, such as the age of a neighborhood. The location groups represent economic homogeneity for properties within their boundaries.

These location groups were used to assist in the development of rates for all property types. The final rental rates, however, were "fine tuned" and assigned to individual commercial neighborhoods. Therefore, different rents could be, and most often were, assigned to the different neighborhoods that make up a particular location group.

Money Market Rates and Capitalization Rates

Another significant factor that has contributed to recent value appreciation over the last 2-3 years is the decline in interest and mortgage rates. These monetary rates are among the economic factors that directly impact the real estate market. In the appraisal of income-producing real estate, the correlation between the changing financial elements of the economy and the quantitative measurement of a property value is accomplished by the use of a composite number called a capitalization rate. The "cap rate" acts as the ratio between the current income stream of a property and the full market value of that property.

By nature, capitalization rates (as used in the income approach to value) are influenced most significantly by three factors:

- (1) interest rates, (2) rates of return on investment capital, and (3) the risk factor in real estate.

Money Market Rates

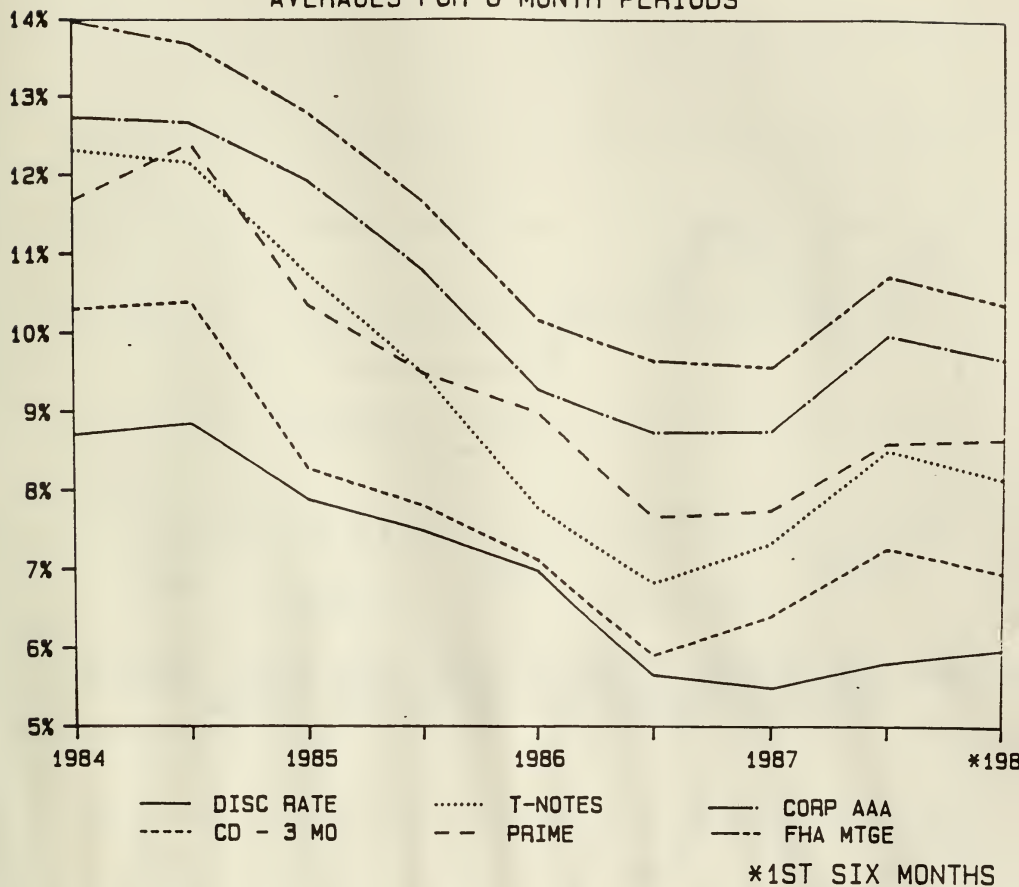
Exhibit COM-1, in the Appendix of this report, presents the historical data on interest rates and "safe" rates of return (i.e. from investments other than real estate). This data was obtained from the official publications of the Federal Reserve Board. These tables show the quoted monthly rates during 1985 through 1988 of seven accepted indicators of mortgage rates and investment return rates (also known as "return on equity").

It is evident from this data that interest rates were somewhat lower in 1986 than in 1985 and previous years, and also that the interest rates remained stable at a relatively low level during the first half of 1987. Although the 1986 annual mortgage rates declined 17.6% from 1985, the last 6-month average rates declined 19.8%, a slightly faster pace. This difference is not considered significant, but any change, either short term or long term, has a potential impact on real estate value.

Mortgage rates increased slightly during the latter part of 1987, and have remained stable during the 1st quarter of 1988. The following graphs display recent trends of both interest rates and mortgage rates.

MARKET INTEREST RATES

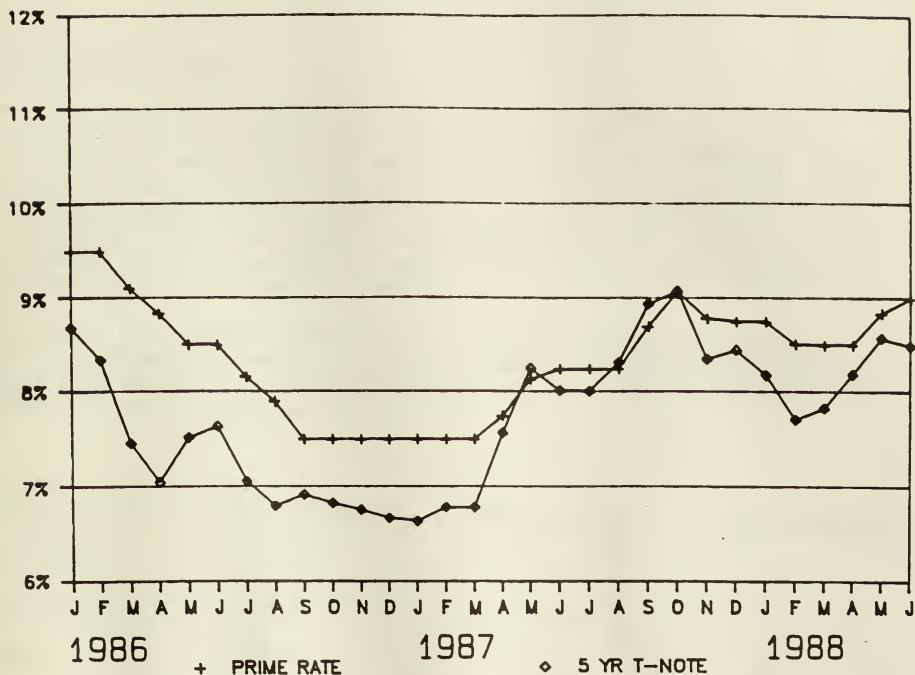
AVERAGES FOR 6-MONTH PERIODS



Source: Federal Home Loan Bank of Boston

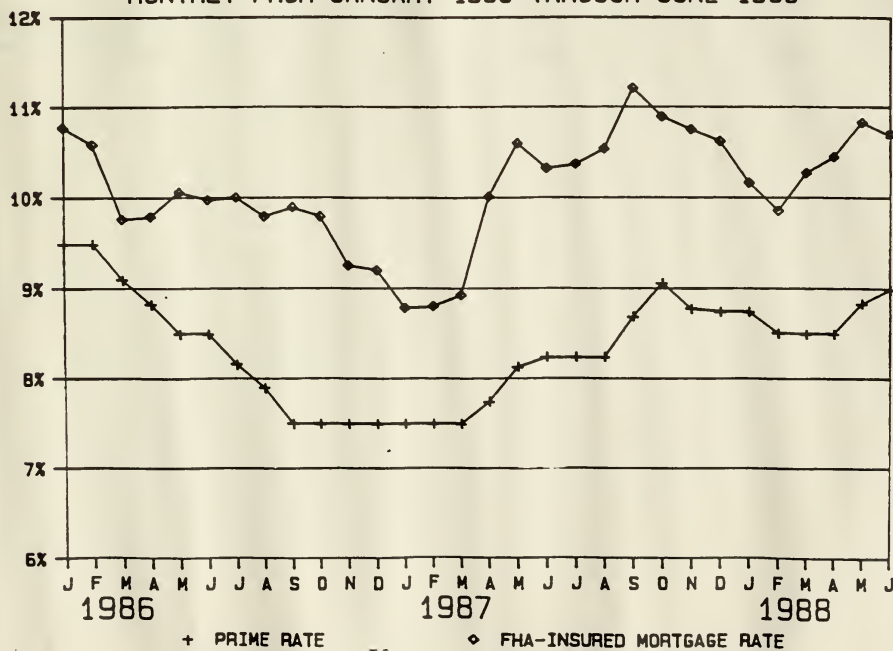
PRIME RATE AND 5-YEAR T-NOTE RATE

MONTHLY FROM JANUARY 1986 THROUGH JUNE 1988



PRIME RATE AND FHA-INSURED MORTGAGE RATE

MONTHLY FROM JANUARY 1986 THROUGH JUNE 1988



Capitalization Rates

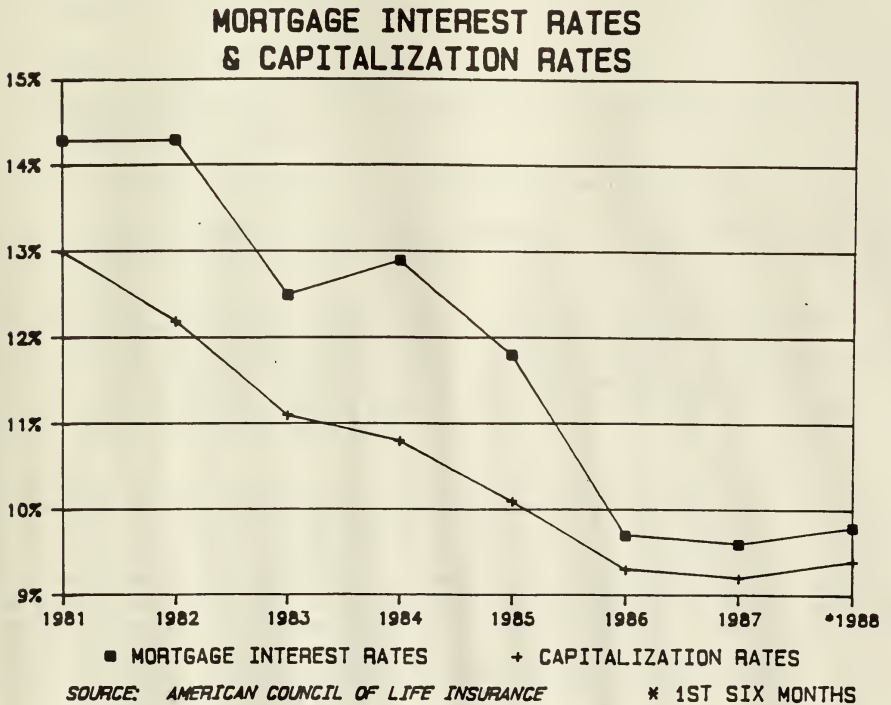
The cap rates developed for the FY'88 and FY'89 Commercial property valuation were calculated on the basis of a standard mortgage-equity formula. This method uses the average interest rates for 1986-87, less a credit for equity build-up and appreciation over the holding period (which is affected by the element of risk), plus the effective tax rate. Additionally, variables such as loan-to-value ratio and holding time of investment were obtained from an extensive survey of Boston-area banks that specialize in commercial lending.

Because of the continued stability of interest and mortgage rates over the past 18 months, leading to January 1, 1988, the income capitalization rates used for the FY'89 revaluation were the same rates as used in the previous year's trending process.

<u>Property Type</u>	<u>FY'87 Cap Rate</u>	<u>FY'88 Cap Rate</u>	<u>FY'89 Cap Rate</u>
Apartment	8.9%	7.1%	7.1%
Industrial	14.1%	13.2%	13.2%
Lodging	14.3%	13.9%	13.9%
Office	11.0%	10.5%	10.5%
Retail	12.0%	11.2%	11.2%
Average for all Commercial property	12.06%	11.18%	11.18%

To check and support these calculated changes in cap rates, they were compared with cap rates published by the American Council of Life Insurance (ACLI) (Exhibit COM -2). The cap rates and interest rates reported here are the result of actual mortgage commitments being made on a continuous basis by 20 major life insurance companies. Since they are after-the-fact results from major transactions, they furnish a sound basis for comparison and support of the cap rates used in Boston.

The following graph shows the correlation between mortgage interest rates and actual capitalization rates, as experienced by the ACLI.



CAPITALIZATION RATE DEVELOPMENT

Net Income Capitalization has been defined as the process by which an indication of value is produced by dividing net operating income by a capitalization rate. There is nothing new or mysterious about this process. Rather, it is accepted in the appraisal industry as a cornerstone in the valuation process for income-producing property. The equation:

$$[\text{Value} = \text{Income} \div \text{Rate}]$$

is actually the same formula as the simple financial equation that is used to calculate interest due on a savings account or a loan. For example, if you deposit \$1,000 for a year into a savings account, at a rate of 8.0 % (simple interest per year), the interest payable after one year is \$80.00.

The interest is computed as follows:

$$\begin{array}{lcl} \text{Interest} & = & \text{Principal} \times \text{Rate} \\ \text{(Income)} & & \text{(Value)} \end{array}$$

$$\$80.00 = \$1,000 \times 8.0 \%$$

By reversing the equation, we can compute (solve for) either the principal "Value" or the "Rate".

$$[\text{Value} = \text{Income} \div \text{Rate}] \qquad [\text{Rate} = \text{Income} \div \text{Value}]$$

Observe that the formula is the same, whether it is used in the financial context or for the calculation of real estate value.

The only real difference is the origin of the rate itself. One rate is called an "interest" rate and is determined by monetary factors or other criteria (also defined generally as the cost to borrow money). The other rate is called a "capitalization" rate, which is derived from the constantly changing real estate market, and is based on the investment criteria of many buyers and sellers in the market place.

The capitalization process for a particular property or group of properties requires the computation of the net operating income, after expenses. First, Potential Gross Income is developed for the subject property, and allowances for vacancy and credit loss are accounted for, resulting in Effective Gross Income. Allowable operating expenses are then deducted from Effective Gross Income yielding the Net Operating Income (NOI). This net operating Income is then capitalized into an indication of value. The capitalization rate is a composite of risk factors which must include return of and return on all investment position capital as well as an allowance for property tax liability.

During the FY'89 revaluation, two separate capitalization methods were used: Direct capitalization and Mortgage-Equity Analysis. The direct capitalization method has an advantage in that it is directly supported by the market, since it involves the use of current market sales. However, the inherent disadvantage is the typical scarcity of reliable, arms-length commercial sales.

Given the limits of the direct capitalization process, mortgage-equity analysis was employed as the primary method for establishing the FY'89 cap rates.

Each capitalization method can be described as follows.

Direct Capitalization - In this approach the overall rate is applied directly to the forecast NOI to develop the estimate of value. Reliable market transactions (arms-length sales) are required on properties that are of the same type and in the same general locations as the subject. These commercial transactions are then analyzed with respect to their selling price and their income stream. The ratio of NOI to sale price represents the overall cap rate.

Mortgage-Equity Analysis - This technique bears many similarities to a band-of investment analysis and the property residual technique of capitalization. The mortgage-equity process seeks to develop an overall rate, and is characterized by the following four features:

First, as in band-of-investment analysis, the property is separated into its mortgage and equity components on the basis of typical interest rates, loan terms, and amortization provisions, as well as the required rate of return to equity.

Second, normal net income is projected over an investment holding period that is ordinarily less than either the mortgage amortization period or the remaining economic life of the property. The holding period should correspond to those observed in the market or indicated in discussions with informed investors. The typical holding period tends to be a function of income tax considerations, such as the allowable depreciation charges and the differential treatment of capital gains.

Third, all returns or losses to the equity position are explicitly recognized and then capitalized at the same rate. These returns or losses can take three forms: (1) cash flow (net income less debt service), (2) equity buildup through loan amortization, and (3) capital appreciation or depreciation. Equity buildup through loan amortization is estimated by computing the percentage of a typical loan that would be paid off over the investment holding period. Capital appreciation or depreciation is estimated as the percentage increase or decrease to the original market value of the property (when first acquired) that is anticipated over the holding period. It is assumed that the value of the reversion at the end of the holding period is realized through resale, refinancing, or conversion.

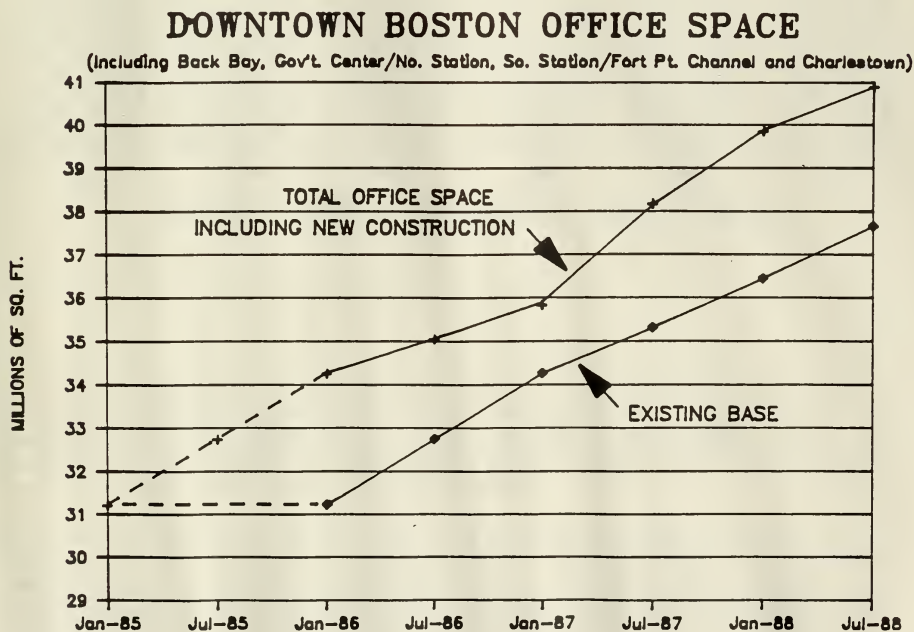
Fourth, mortgage-equity analysis assumes that the income stream of the property over the investment holding period is a level annuity or has been converted to a level annuity.

Exhibit com-6 in the appendix illustrates the actual mortgage-equity analysis that was used to establish the FY'89 cap rates.

COMMERCIAL VALUATION: CENTRAL BUSINESS DISTRICT

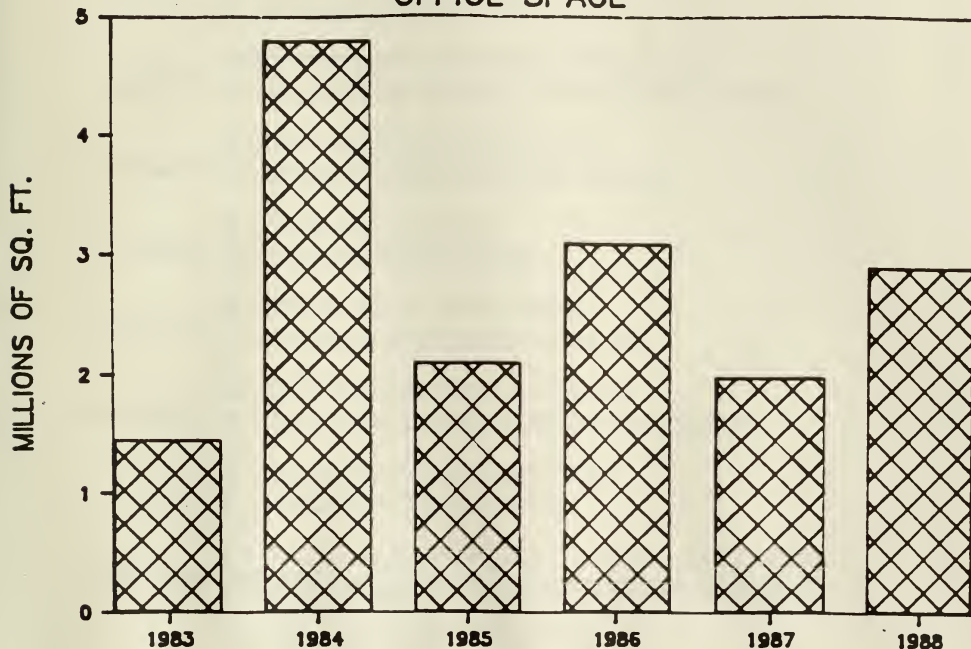
Since supply and demand directly impacts available rental space, and therefore rental rates, the changes to the supply of downtown office space must be considered. Currently, the total inventory of office space in downtown Boston stands at approximately 37 million square feet, not including 3 million sq. ft. of space still under construction.

During the last 5 years alone (from 1983 to 1988), about 13.5 million square feet have been built and readily occupied by tenants because of the tremendous demand in Boston. This demand has served to drive up rental rates, which in turn drives up the property values, since the value of this type of property is largely a function of the income stream that is generated by the property. The following charts depict the growth of the office market in Boston, along with the corresponding rental rate and vacancy rate activity.



Source: Cushman & Wakefield, BOSTON TREND

NEW CONSTRUCTION IN DOWNTOWN BOSTON OFFICE SPACE

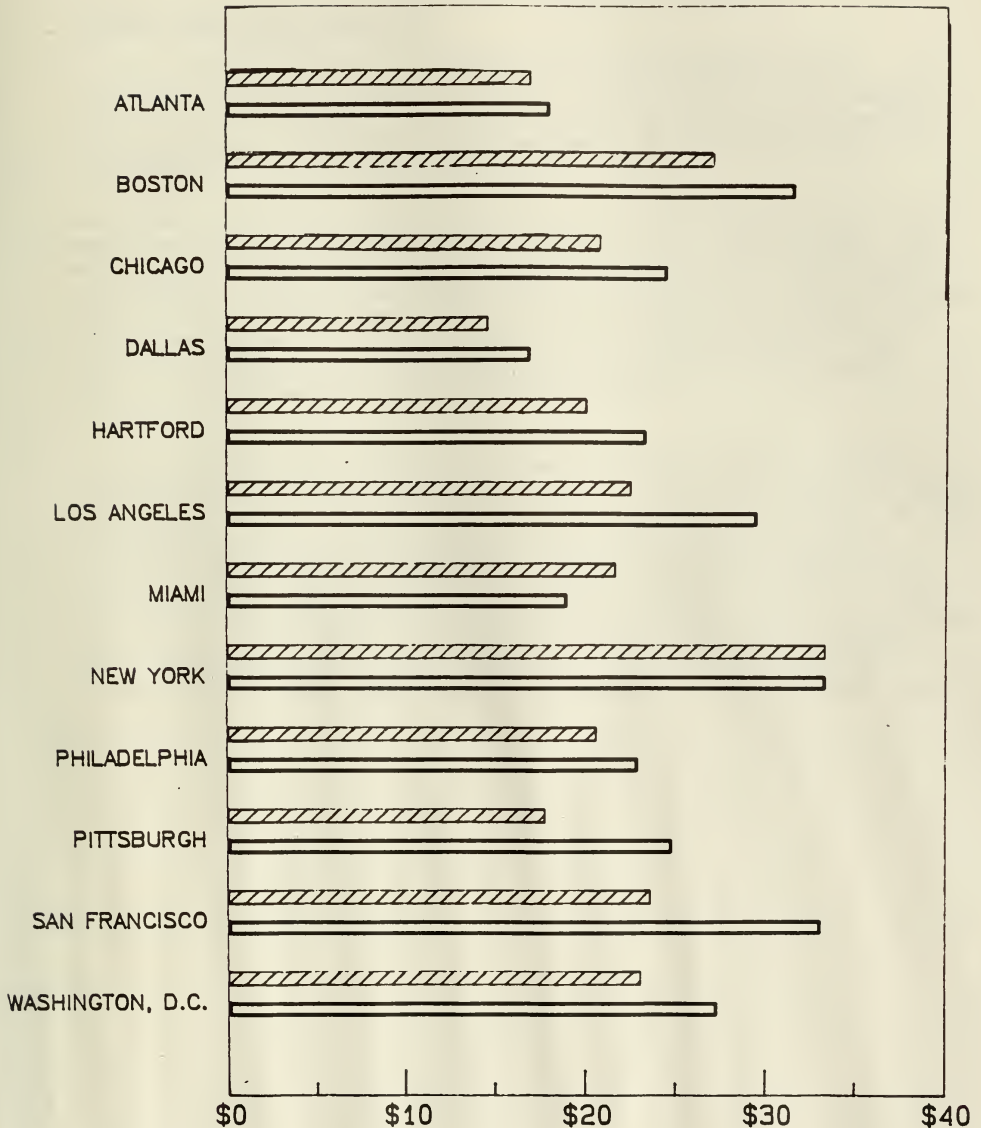


Source: Cushman & Wakefield, *BOSTON TREND*

The strong demand for office space is also reflected in the overall vacancy rate for downtown Boston, which was one of the lowest in the country during the latter half of 1986. However, during 1987, the vacancy rate has steadily crept upward, which happens when the existing supply of space grows faster than the demand.

What we have witnessed during 1987 is a gradual slowdown of growth in downtown Boston, and this is reflected by a relatively small increase in office rents. It should be pointed out that, although the outlying neighborhoods of the City and central business area have appreciated in value over the last several years, these two regions do not necessarily appreciate at the same rate. While the rents in downtown Boston have increased at moderate rate of 6 - 8 % per year on average, rents in most of the outlying neighborhoods have increased considerably more.

NATIONWIDE COMPARISON OF OFFICE RENTAL RATES



AVERAGE YEAR-END RENT PER SQ. FT.

▨ TOTAL DOWNTOWN OFFICE

▬ CLASS A OFFICE
(over 600,000 S.F.)

Source: 1988 BOMA Experience Exchange Report

Current Market Sales Analysis

An essential part of any revaluation is the value-testing process. The continuous turnover of property creates a "market" that can be measured and held up as a standard. The ratios that are derived from comparing actual sales to value estimates (assessments) are constantly used as a performance indicator of the CAMA system.

One of the first steps undertaken in this revaluation was to measure the market appreciation that has occurred over the last several years. The existence of a meaningful pattern of market appreciation lends support and validity to the income capitalization process and sale-ratio analyses that follow. The most common unit of measure used in the analysis of real estate values is value-per-square foot of building area. This measure is also used to track changes in property value from year to year, by using sales that occur during each year.

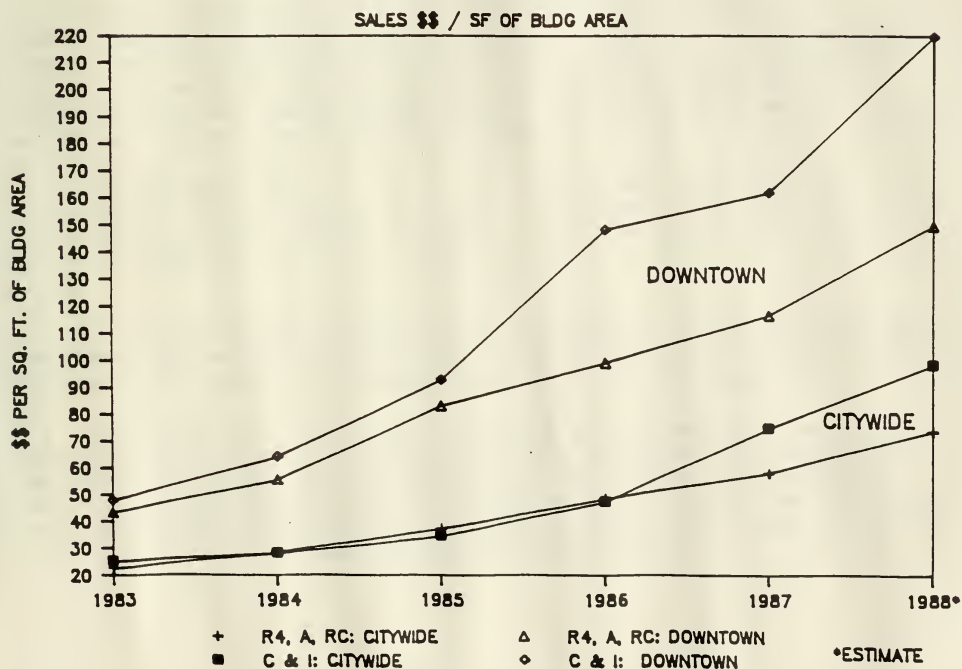
In order to mark recent trends of commercial property value in Boston, a sale-per-square foot analysis was performed. First, the commercial sales were segregated by class into one group, and all of the apartment, R4 and RC sales were combined into another group. The sales were further stratified by location: (a) Downtown and Back Bay, which comprise the Central Business District (CBD), and (b) the outlying districts. The table and graph on the following page show the median sales price-per-sq. ft. of fair market sales that occurred during the years 1984 through 1987. The percentage difference from year to year (for each group) indicates the general rate of market appreciation of that property type.

MARKET APPRECIATION: BOSTON REAL ESTATE VALUES

MEDIAN SALE \$\$ PER SQUARE FOOT OF BUILDING AREA

<u>YEAR</u>	<u>PROPERTY TYPE</u>	<u>CITY WIDE TOTAL</u>	<u>CENTRAL BUSINESS DISTRICT</u>	<u>OUTLYING AREA</u>
1984	C, I	\$ 28.47	\$ 64.35	\$ 25.41
	A, R4, RC	\$ 28.75	\$ 55.78	\$ 22.78
1985	C, I	\$ 34.86	\$ 93.06	\$ 30.70
	A, R4, RC	\$ 37.60	\$ 83.53	\$ 31.09
1986	C, I	\$ 47.79	\$148.48	\$ 39.84
	A, R4, RC	\$ 48.83	\$ 99.41	\$ 40.64
1987	C, I	\$ 75.00	\$162.04	\$ 51.20
	A, R4, RC	\$ 58.33	\$116.89	\$ 49.99

COMMERCIAL MARKET APPRECIATION



Sale Ratios: Assessment Performance Indicators

The sale ratio approach to determining the validity of the assessed values for commercial properties is essentially similar in procedure to the sale/assessment ratio method used for the residential property. Each sale is compared to its new FY'89 assessment (as of January 1, 1988), which produces a ratio. All the ratios are grouped according to specific criteria and either a mean (average) or median (middle value) is calculated. The median is the preferred statistic, since it usually more precise.

Since there are much fewer commercial sales than residential sales, particularly for the individual classes, a much broader locational stratification must be used. At the same time, the broader locational stratification is particularly suitable for these classes in order to distinguish value changes between the central business area (downtown) and the rest of the city.

The 57 commercial assessment districts were split into two regions because of the differences in both property characteristics and property values that exist between two regions. The two locational regions are:

- 1) Ten commercial assessment districts (#60-100) representing Downtown and Back Bay; and
- 2) Forty-seven remaining commercial assessment districts for the outlying areas of the city.

Because of the complex variety of income-producing property, stratification by property type is necessary in order to develop meaningful trends from the sale/assessment ratios. One reason for this is that the values of a particular type of property may change or appreciate at a different rate than another property type. Therefore, the commercial property was separated into seven homogeneous groups:

- | | |
|-----------------------------------|----------------------|
| (1) Apartment (A) | (5) Comm. Condo (CC) |
| (2) APT:4-6 Unit (R4) | (6) Comm. Land (CL) |
| (3) Residential - Commercial (RC) | (7) Industrial (I) |
| (4) Commercial (C) | |

The following table displays the sale/assessment ratios for those sales that have occurred during 1986 - 1987. This is the time frame that is most appropriate to serve as a foundation for the new FY'89 values.

The ratios are a comparison of the 1986 and 1987 market sales to their respective assessments as of January 1, 1988. They have been stratified according to property type and location, and the median sales/assessment ratios have been calculated for each property class. Since time is a factor to be considered when appraising the market value of real estate, all of the sales were then time-adjusted to the index of 1-1-88.

MEDIAN ASSESSMENT/SALE RATIOS

(1986 - 1987 SALES)

CITY-WIDE			DOWNTOWN AND BACK BAY (CAD # 60 - 100)		OUTLYING AREAS	
<u>PROPERTY CLASS</u>	<u>No. Of SALES</u>	<u>MEDIAN (Ratio)</u>	<u>No. Of SALES</u>	<u>MEDIAN (Ratio)</u>	<u>No OF SALES</u>	<u>MEDIAN (Ratio)</u>
A	52	.99	20	.95	32	1.02
R4	170	.97	33	.90	137	.98
RC	103	.99	14	.90	89	.99
C	112	.90	28	.87	84	.90
CC	54	.94	44	.96	10	.92
CL	29	.93	1	NA	28	.93
I	<u>16</u>	.86	<u>0</u>	NA	<u>16</u>	.86
TOTALS:	536		140		396	

The sale/assessment ratios measure the disparity between the individual assessments and sale prices, which are representative of the current market. When analyzed as a group, the pattern of ratios will suggest the direction and magnitude of the assessment level for a particular group of properties.

The value of sale ratios lies in their direct link to the market, and thus they provide firm market support for the values that are produced via the Income Approach to value.

COMMERCIAL COST SYSTEM

The Boston CAMA system produces a market value estimate by means of the Cost Approach to value, which supplements and supports the Income value estimate. The cost approach involves combining the value of the site with the value of any improvements to the site.

The cost tables in the system, which represent the average construction costs of various building types, are obtained directly from the Marshall and Swift Valuation Service. This national service compiles actual construction costs on a continuous basis and publishes them for use in the real estate industry. All construction costs in the system are adjusted to reflect the current Boston market as of the specific valuation date (January 1, 1988).

Cost Methodology

There are four basic steps to the cost approach to value: (1) calculate the total cost to build the specific improvement; (2) estimate the amount of depreciation that has accrued to the improvement, based on its effective age; and (3) deduct the percentage amount of depreciation from the replacement cost of a new building; and (4) add the value of the land.

The Boston CAMA system includes a comprehensive set of built-in tables which contain commercial, industrial and residential replacement costs. The actual construction costs are in the standard form of dollars-per-square foot. All tables were updated for the FY'89 revaluation, since construction rates change periodically. The system also has a built-in table of depreciation, which is tied into the quality, age and condition of the building. Since it is important that information of this nature be accurate and up-to-date, it is constantly reviewed by Assessing personnel and through the data-collection and field review process. A sample of the cost tables as well as the FY'89 depreciation table is included in the appendix, as exhibits com-7/8.

At the same time that the cost tables were updated, new land values were being developed based on the current market. Once this was completed, the testing process of new values began, via sales ratio analysis.

COMMERCIAL LAND VALUATION

The objective of land valuation is to develop and implement a consistent pattern of land values that reflect the current market, which implies equitable treatment in the assessment of each parcel relative to other properties in the same locale and with the same amenities. The task of implementing a new set of land values for FY'89 actually involved a three-part operation.

The first phase included a study of the actual market itself, namely recent land sales and land residuals. The second phase involved using the computer system to generate new land values. The final phase included a review of land values, and a review of vacant land parcels.

The City of Boston is divided into 57 commercial assessment districts (CAD) which are delineated according to neighborhood development patterns. (see Appendix, Exhibit com-9). The assessment district has no relation to the traditional political ward-precinct boundary lines. All of the market analyses done in preparation of new land rates were done according to the CAD lines.

The Boston CAMA system utilizes the standard square foot value as a unit of measure, to value commercial, industrial and apartment land. Each parcel record has a field to store a square-foot unit rate. In the two interim years since the FY'86 revaluation, the land value on each parcel has been trended to current market levels.

Market Analysis and Procedure

The first task for the FY'89 revaluation was to establish the current market level (of land values), then measure the gap between the current market and the FY'88 land values, and finally, replace the FY'88 base land rates with new FY'89 rates.

After conducting sales and residual analyses to measure the current market, an index factor was developed for each of the commercial assessment districts, which was then applied to the FY'88 base rates. The new base rates were then used to generate a new land value for each parcel. Once this was done, the normal market analysis continued, followed by a full field review.

The analysis of the market with respect to land value was undertaken in a logical manner, utilizing accepted valuation techniques and standards of measure. Two separate approaches were considered:

- (1) vacant land sales
- (2) residual land values (abstraction method)

VACANT LAND SALES

Historically, a precise analysis of the market values of vacant land has been hindered by a scarcity of good, arms-length sales. To compensate for this, the initial sales-ratio study included sales from 1984 through 1987, which numbered approximately 250 sales. Each sale was reviewed in the field, then analyzed in relation to surrounding property values.

Proper assessment practices dictate that all land values in a particular area should be uniform and consistent, and while a sale is indicative of value, it does not necessarily "set" the value. This means that although a parcel may be a recent sale, the assessment placed on that parcel should still reflect the general level of value along the street or in the immediate locale.

Since geographic location is of critical importance, all of the sales were combined into 9 regional groups, which are representative of the major neighborhoods of the City. All of the sales were time-adjusted to January 1, 1988 to reflect the rapid acceleration of market values over the last four years. The '84 and '85 sales were time-adjusted at the rate 1.5% of per month (18% per year), and the '86 and '87 sales were adjusted more conservatively at the rate of 12% per year.

The sales-ratio analysis using FY'88 land values yielded the following regional "index factors".

<u>Region</u>	<u>Neighborhood</u>	<u>CAD</u>	<u># Sales</u>	<u>Index factor</u> (median)
1	East Boston	5-20	28	1.25
2	Charlestown	25-40	15	1.15
3	Allston/Brighton	45-55	25	1.33
4	CBD/Back Bay	60-100	27	1.38
5	South Boston	103-120	77	1.16
6	Dorchester	125-130, 150-165	20	1.25
7	Roxbury/Mattapan	135-140, 170-185	27	1.30
8	Hyde Park/J.P.145,	180, 190-193	15	1.28
9	West Roxbury	195-245	12	1.27

These preliminary index factors were used as the basis for the final set of CAD factors which were applied to the FY'88 base rates. The CAD factors were multiplied by the FY'88 rates, and the result became the FY'89 land rates.

As a final check on the validity of the new land values, several sales-ratio analyses were conducted again in June 1988, approximately five months after the initial land values were established. Once again, all sales were time-adjusted to the index date 1-1-88. The results are consistent.

63 sales, 1986-87 only: Median ratio = .92
119 sales, 1985-87: Median Ratio = .91

Therefore, the FY'89 land values are supported by the market (vacant land sales).

Once the FY'89 land values were established, a review process was started which included review of land values for vacant land as well as improved properties. The review process spanned several months. Once full values were generated via the income and cost methods, proper residual analyses could be completed.

RESIDUAL LAND VALUATION

Among the various land valuation techniques available to the appraiser, the most commonly used and usually most reliable is the residual method that employs the cost approach to value improved property. This method is sometimes referred to as the "abstraction" method of obtaining residual land value. It involves subtracting the depreciated replacement cost of improvements from the sale price of an improved property. The result is considered to be an estimate of the land component of the total property value, or in other words, the land value beneath the improvement.

This method was used during this revaluation in order to support the values that were indicated by the market analysis (sales) approach. After time-adjusting all arms-length sales of improved properties, land residuals were then calculated. The most useful application of this method occurs when the residuals, as a group, form a pattern in a particular area, rather than using any one specific residual as a value indicator. This is because the cost approach itself is subject to certain inherent limitations, such as the variance and subjectivity of the depreciation rating on older buildings.

Aside from the above-mentioned problem areas, the residual analyses using the cost approach do support the land values that were indicated by the market. Following here is a brief description of the steps involved.

First, a total of 876 sales were combined for analysis, which included 1985 through 1987 sales for property in classes C, I, A, R4, and RC. The commercial sales (class C & I) total 282 sales; the apartment sales (classes A, R4, RC) total 594 sales.

Sales - Ratio Analysis (#1) complete sample 876 sales:

Income Values: Median Ratio = 1.01

Cost Values : Median Ratio = .82

As a check on these results, the sales sample was then screened to eliminate extreme ratios; ratios less than 0.50 or greater than 2.00 were eliminated using the income values as a criteria. Only 59 sales dropped out, and the median ratios did not change.

Next, the sales were separated by property class and tested. Out of the new (screened) total of 817 sales, there were 255 C & I sales, and 562 A-R4-RC sales.

Sales - Ratio Analysis (#2):

C & I (255 sales) median ratio (income) = .96 / median ratio (cost) = .98
A, R4, RC (562 sales) median ratio (income) = 1.03 / median ratio (cost) = .79

At this point, the cost approach is shown to be less reliable for apartment, R4 and RC property, than with commercial and industrial property. Even though the replacement cost and depreciation schedules are believed to be "on target", the sale-ratios derived from the cost approach seem to be on the low side for apartment property.

At the same time, the cost ratios remain consistent for the C & I property. Since the land residual analysis utilizes the cost approach to value, it is necessary that the cost approach has some degree of reliability. This reliability is demonstrated by the median ratio of .98 for C & I properties, based on 255 sales.

The final step in the residual process is to calculate the residual amount that would theoretically be attributable to land. This is simply the difference between the time-adjusted sale price and the depreciated replacement cost (RCNLD) of the improvement. The residual land value is compared to the established FY'89 land value, which produces a "land-index" ratio. For the 255 C & I sales, the median land-index ratio is shown to be 0.94, which says in effect that the land is being assessed at full market value.

Therefore, the land residual approach supports the FY'89 land values.

FY'89 REVALUATION REPORT

SECTION 4: APPENDIX, EXHIBITS

APPENDIX 1: Commercial

APPENDIX 2: Data Quality Control

APPENDIX

APPENDIX I: Commercial, Industrial, Apartment

<u>EXHIBIT#</u>	<u>DESCRIPTION</u>
COM-1	Interest Rates (1986 - 88)
COM-2	Capitalization Rates (1984 - 88)
COM-3	Market data: rents, sales
COM-4	Rental Rate Standards
COM-5	Tenant Appeal Index
COM-6	Capitalization Rate Analysis
COM-7	Cost Rate Tables
COM-8	Depreciation Table
COM-9	Commercial District Map

MONEY MARKET RATESCAPITAL MARKET RATES

	Prime Rate	FHA Mtg Rate	Federal Funds	Cert of Deposit (3 Mon)	Disc. Window Borrow	U.S. Treas notes, bonds 5 year	Corp. Bonds (seasoned) AAA
Jan	9.50	10.78	8.14	7.82	7.50	8.68	10.05
Feb	9.50	10.59	7.86	7.69	7.50	8.34	9.67
Mar	9.10	9.77	7.48	7.24	7.10	7.46	9.00
Apr	8.83	9.80	6.99	6.60	6.83	7.05	8.79
May	8.50	10.07	6.85	6.65	6.50	7.52	9.09
Jun	8.50	9.98	6.92	6.73	6.50	7.64	9.13
Jul	8.16	10.01	6.56	6.37	6.16	7.06	8.88
Aug	7.90	9.80	6.17	5.92	5.82	6.80	8.72
Sept	7.50	9.90	5.89	5.71	5.50	6.92	8.89
Oct	7.50	9.80	5.85	5.69	5.50	6.83	8.86
Nov	7.50	9.26	6.04	5.76	5.50	6.76	8.68
Dec	7.50	9.21	6.91	6.04	5.50	6.67	8.49

Average

Annual	18.33	9.91	6.81	6.52	6.33	7.31	9.02
--------	-------	------	------	------	------	------	------

July - Dec only

7.68	9.66	6.24	5.92	5.66	6.84	8.75
------	------	------	------	------	------	------

1987

MONEY MARKET RATESCAPITAL MARKET RATES

	Prime Rate	FHA Mtge Rate	Federal Funds	Cert of Deposit (3 MON)	Discount Rate	U.S. Treas. 5-year Notes	Corp Bonds (seasoned) AAA
JAN	7.50	8.79	6.43	5.87	5.50	6.64	8.36
FEB	7.50	8.81	6.10	6.10	5.50	6.79	8.38
MAR	7.50	8.94	6.13	6.17	5.50	6.79	8.36
APR	7.75	10.02	6.37	6.52	5.50	7.57	8.85
MAY	8.14	10.61	6.85	6.99	5.50	8.26	9.33
JUN	8.25	10.33	6.73	6.94	5.50	8.02	9.32
JUL	8.25	10.38	6.58	6.70	5.50	8.01	9.42
AUG	8.25	10.55	6.73	6.75	5.50	8.32	9.67
SEP	8.70	11.22	7.22	7.37	5.95	8.94	10.18
OCT	9.07	10.90	7.29	8.02	6.00	9.08	10.52
NOV	8.78	10.76	6.69	7.24	6.00	8.35	10.01
DEC	8.75	10.63	6.77	7.66	6.00	8.45	10.11
AVERAGES (Jan - Jun)							
	7.77	9.58	6.44	6.43	5.50	7.35	8.77
AVERAGES (Jul - Dec)							
	8.63	10.74	6.88	7.29	5.83	8.53	9.99
ANNUAL AVERAGES							
	8.20	10.16	6.66	6.86	5.66	7.94	9.39

1988MONEY MARKET RATESCAPITAL MARKET RATES

	Prime Rate	FHA Mtge Rate	Federal Funds	Cert of Deposit (3 MON)	Discount Rate	U.S. Treas. 5-year Notes	Corp Bonds (seasoned) AAA
JAN	8.75	10.17	6.83	6.92	6.00	8.18	9.88
FEB	8.51	9.86	6.58	6.60	6.00	7.71	9.40
MAR	8.50	10.28	6.58	6.63	6.00	7.83	9.39
APR	8.50	10.46	6.87	6.92	6.00	8.19	9.67
MAY	8.84	10.84	7.09	7.24	6.00	8.58	9.90
JUN	9.00	10.65	7.51	7.51	6.00	8.49	9.86
AVERAGES (Jan - Jun)							
	8.68	10.38	6.91	6.97	6.00	8.16	9.68

EXHIBIT COM - 2

CAPITALIZATION RATES FOR
MULTIFAMILY AND NON-RESIDENTIAL MORTGAGES
(AMERICAN COUNCIL ON LIFE INSURANCE)

PERIOD (Quarter)		AVERAGE CAPITALIZATION RATE (%)	ANNUAL AVERAGE
-----		-----	-----
1984	1st	10.8%	10.8%
	2nd	10.5%	
	3rd	11.2%	
	4th	10.8%	
1985	1st	10.5%	10.1%
	2nd	10.2%	
	3rd	9.9%	
	4th	9.8%	
1986	1st	9.5%	9.3%
	2nd	9.3%	
	3rd	9.1%	
	4th	9.1%	
1987	1st	9.1%	9.2%
	2nd	9.2%	
	3rd	9.2%	
	4th	9.4%	
1988	1st	9.4%	

MARKET RENT DOCUMENTATION

(Sample Page)

CAD(S)	MARKET RETAIL	RENT TYPE I	DOCUMENTATION AVERAGE CITYWIDE SALE PRICE/SQ.FT. \$67.00							
	INCOME/EXPENSE STATEMENT	R.M. BRADLEY INCOME COLL.	SALES SP/SQFT	EXP/VAC T.A.I. CAD 005-020	10,000 45%	11.1% 40%	RETAIL/SERVICE 35%	30%	25%	
5-20	2.06 - 15.69	3.40-14.67	38.12-67.80	MKT RENT VAL/S.F.	2.35 11.62	4.37 21.64	6.40 31.71	8.72 43.21	11.20 55.50	
025-040	7.22 - 11.00	5.45-9.36	NONE	025-040 MKT RENT VAL/S.F.	2.35 11.62	4.37 21.64	6.40 31.71	8.72 43.21	11.20 55.50	
045-055	4.28 - 25.00	3.63-45.98	75.32-113.58	045-055 MKT RENT VAL/S.F.	4.76 23.59	9.02 44.67	12.48 61.84	16.02 79.39	18.06 89.49	
60	5.18 - 9.05	88	NONE	060 MKT RENT VAL/S.F.	6.72 17.34	10.02 27.75	16.48 39.64	19.95 54.01	24.92 69.37	
65	4.92 - 6.23	88	NONE	065 MKT RENT VAL/S.F.	6.48 32.08	9.46 46.89	12.80 63.42	15.91 78.85	17.36 86.02	
70	14.11	88	NONE	070 MKT RENT VAL/S.F.	6.48 32.08	10.53 52.17	19.36 95.93	28.89 143.12	32.48 160.94	

STANDARD INCOME TABLES FOR RETAIL (TYPE 1)

OCC# 311, 319-330, 330, 333, 360-361, 374-375, 377, 433-439

ASSESSMENT DISTRICT: 5

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.33	\$3.30	\$4.37	\$5.37	\$6.40	\$7.56	\$8.72	\$9.96	\$11.20
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.85	\$2.61	\$3.45	\$4.24	\$5.06	\$5.97	\$6.89	\$7.87	\$8.85

ASSESSMENT DISTRICT: 7

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.33	\$3.30	\$4.37	\$5.37	\$6.40	\$7.56	\$8.72	\$9.96	\$11.20
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.85	\$2.61	\$3.45	\$4.24	\$5.06	\$5.97	\$6.89	\$7.87	\$8.85

ASSESSMENT DISTRICT: 10

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.33	\$3.30	\$4.37	\$5.37	\$6.40	\$7.56	\$8.72	\$9.96	\$11.20
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.85	\$2.61	\$3.45	\$4.24	\$5.06	\$5.97	\$6.89	\$7.87	\$8.85

ASSESSMENT DISTRICT: 13

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.33	\$3.30	\$4.37	\$5.37	\$6.40	\$7.56	\$8.72	\$9.96	\$11.20
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.85	\$2.61	\$3.45	\$4.24	\$5.06	\$5.97	\$6.89	\$7.87	\$8.85

ASSESSMENT DISTRICT: 15

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.33	\$3.30	\$4.37	\$5.37	\$6.40	\$7.56	\$8.72	\$9.96	\$11.20
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.85	\$2.61	\$3.45	\$4.24	\$5.06	\$5.97	\$6.89	\$7.87	\$8.85

ASSESSMENT DISTRICT: 20

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.33	\$3.30	\$4.37	\$5.37	\$6.40	\$7.56	\$8.72	\$9.96	\$11.20
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.85	\$2.61	\$3.45	\$4.24	\$5.06	\$5.97	\$6.89	\$7.87	\$8.85

ASSESSMENT DISTRICT: 25

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.33	\$3.30	\$4.37	\$5.37	\$6.40	\$7.56	\$8.72	\$9.96	\$11.20
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.85	\$2.61	\$3.45	\$4.24	\$5.06	\$5.97	\$6.89	\$7.87	\$8.85

STANDARD INCOME TABLES FOR RETAIL (TYPE 2)
 OCC# 321-324, 362-366, 369
 (DISCOUNT STORE, SUPERMARKET, ENTERTAINMENT, ETC.)

ASSESSMENT DISTRICT: 5

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$1.48	\$1.98	\$2.45	\$3.10	\$3.80	\$4.86	\$6.02	\$6.98	\$7.99
STD EXP (Z)	45.0Z	42.5Z	40.0Z	37.5Z	35.0Z	32.5Z	30.0Z	27.5Z	25.0Z
NET INC/SF:	\$0.81	\$1.14	\$1.47	\$1.94	\$2.47	\$3.28	\$4.21	\$5.06	\$5.99

ASSESSMENT DISTRICT: 7

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$1.48	\$1.98	\$2.45	\$3.10	\$3.80	\$4.86	\$6.02	\$6.98	\$7.99
STD EXP (Z)	45.0Z	42.5Z	40.0Z	37.5Z	35.0Z	32.5Z	30.0Z	27.5Z	25Z
NET INC/SF:	\$0.81	\$1.14	\$1.47	\$1.94	\$2.47	\$3.28	\$4.21	\$5.06	\$5.99

ASSESSMENT DISTRICT: 10

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$1.48	\$1.98	\$2.45	\$3.10	\$3.80	\$4.86	\$6.02	\$6.98	\$7.99
STD EXP (Z)	45.0Z	42.5Z	40.0Z	37.5Z	35.0Z	32.5Z	30.0Z	27.5Z	25Z
NET INC/SF:	\$0.81	\$1.14	\$1.47	\$1.94	\$2.47	\$3.28	\$4.21	\$5.06	\$5.99

ASSESSMENT DISTRICT: 13

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$1.48	\$1.98	\$2.45	\$3.10	\$3.80	\$4.86	\$6.02	\$6.98	\$7.99
STD EXP (Z)	45.0Z	42.5Z	40.0Z	37.5Z	35.0Z	32.5Z	30.0Z	27.5Z	25Z
NET INC/SF:	\$0.81	\$1.14	\$1.47	\$1.94	\$2.47	\$3.28	\$4.21	\$5.06	\$5.99

ASSESSMENT DISTRICT: 15

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$1.48	\$1.98	\$2.45	\$3.10	\$3.80	\$4.86	\$6.02	\$6.98	\$7.99
STD EXP (Z)	45.0Z	42.5Z	40.0Z	37.5Z	35.0Z	32.5Z	30.0Z	27.5Z	25Z
NET INC/SF:	\$1.17	\$1.56	\$1.94	\$2.45	\$3.00	\$3.84	\$4.76	\$5.51	\$6.31

ASSESSMENT DISTRICT: 20

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$1.48	\$1.98	\$2.45	\$3.10	\$3.80	\$4.86	\$6.02	\$6.98	\$7.99
STD EXP (Z)	45.0Z	42.5Z	40.0Z	37.5Z	35.0Z	32.5Z	30.0Z	27.5Z	25Z
NET INC/SF:	\$1.17	\$1.56	\$1.94	\$2.45	\$3.00	\$3.84	\$4.76	\$5.51	\$6.31

ASSESSMENT DISTRICT: 25

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$1.48	\$1.98	\$2.45	\$3.10	\$3.80	\$4.86	\$6.02	\$6.98	\$7.99
STD EXP (Z)	45.0Z	42.5Z	40.0Z	37.5Z	35.0Z	32.5Z	30.0Z	27.5Z	25Z
NET INC/SF:	\$1.17	\$1.56	\$1.94	\$2.45	\$3.00	\$3.84	\$4.76	\$5.51	\$6.31

ASSESSMENT DISTRICT: 5

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.51	\$3.90	\$5.60	\$6.80	\$8.00	\$9.74	\$11.56	\$13.27	\$14.94
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.38	\$2.25	\$3.36	\$4.25	\$5.20	\$6.57	\$8.09	\$9.62	\$11.21

ASSESSMENT DISTRICT: 7

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.51	\$3.90	\$5.60	\$6.80	\$8.00	\$9.74	\$11.56	\$13.27	\$14.94
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.38	\$2.25	\$3.36	\$4.25	\$5.20	\$6.57	\$8.09	\$9.62	\$11.21

ASSESSMENT DISTRICT: 10

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.51	\$3.90	\$5.60	\$6.80	\$8.00	\$9.74	\$11.56	\$13.27	\$14.94
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.38	\$2.25	\$3.36	\$4.25	\$5.20	\$6.57	\$8.09	\$9.62	\$11.21

ASSESSMENT DISTRICT: 13

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.51	\$3.90	\$5.60	\$6.80	\$8.00	\$9.74	\$11.56	\$13.27	\$14.94
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.38	\$2.25	\$3.36	\$4.25	\$5.20	\$6.57	\$8.09	\$9.62	\$11.21

ASSESSMENT DISTRICT: 15

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.51	\$3.90	\$5.60	\$6.80	\$8.00	\$9.74	\$11.56	\$13.27	\$14.94
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.38	\$2.25	\$3.36	\$4.25	\$5.20	\$6.57	\$8.09	\$9.62	\$11.21

ASSESSMENT DISTRICT: 20

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.51	\$3.90	\$5.60	\$6.80	\$8.00	\$9.74	\$11.56	\$13.27	\$14.94
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.38	\$2.25	\$3.36	\$4.25	\$5.20	\$6.57	\$8.09	\$9.62	\$11.21

ASSESSMENT DISTRICT: 25

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.99	\$4.39	\$6.02	\$7.91	\$10.00	\$12.27	\$14.69	\$16.43	\$18.00
STD EXP (%)	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%	27.5%	25.0%
NET INC/SF:	\$1.65	\$2.52	\$3.61	\$4.94	\$6.50	\$8.28	\$10.28	\$11.91	\$13.50

STANDARD INCOME TABLES

INDUSTRIAL WAREHOUSE, PARKING, MANUFACTURING)

OCC# 310, 312-314, 316-318, 336-338, 400, 401, 409, 414-418

ASSESSMENT DISTRICT: 5

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.00	\$2.50	\$3.00	\$3.40	\$3.76	\$4.07	\$4.27	\$4.77	\$5.28
STD EXP (%)	21%	21%	21%	21%	21%	21%	21%	21%	21%
NET INC/SF:	\$1.58	\$1.98	\$2.37	\$2.68	\$2.97	\$3.21	\$3.37	\$3.77	\$4.17

ASSESSMENT DISTRICT: 7

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.00	\$2.50	\$3.00	\$3.40	\$3.76	\$4.07	\$4.27	\$4.77	\$5.28
STD EXP (%)	21%	21%	21%	21%	21%	21%	21%	21%	21%
NET INC/SF:	\$1.58	\$1.98	\$2.37	\$2.68	\$2.97	\$3.21	\$3.37	\$3.77	\$4.17

ASSESSMENT DISTRICT: 10

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.00	\$2.50	\$3.00	\$3.40	\$3.76	\$4.07	\$4.27	\$4.77	\$5.28
STD EXP (%)	21%	21%	21%	21%	21%	21%	21%	21%	21%
NET INC/SF:	\$1.58	\$1.98	\$2.37	\$2.68	\$2.97	\$3.21	\$3.37	\$3.77	\$4.17

ASSESSMENT DISTRICT: 13

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.00	\$2.50	\$3.00	\$3.40	\$3.76	\$4.07	\$4.27	\$4.77	\$5.28
STD EXP (%)	21%	21%	21%	21%	21%	21%	21%	21%	21%
NET INC/SF:	\$1.58	\$1.98	\$2.37	\$2.68	\$2.97	\$3.21	\$3.37	\$3.77	\$4.17

ASSESSMENT DISTRICT: 15

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.00	\$2.50	\$3.00	\$3.40	\$3.76	\$4.07	\$4.27	\$4.77	\$5.28
STD EXP (%)	21%	21%	21%	21%	21%	21%	21%	21%	21%
NET INC/SF:	\$1.58	\$1.98	\$2.37	\$2.68	\$2.97	\$3.21	\$3.37	\$3.77	\$4.17

ASSESSMENT DISTRICT: 20

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.00	\$2.50	\$3.00	\$3.40	\$3.76	\$4.07	\$4.27	\$4.77	\$5.28
STD EXP (%)	21%	21%	21%	21%	21%	21%	21%	21%	21%
NET INC/SF:	\$1.58	\$1.98	\$2.37	\$2.68	\$2.97	\$3.21	\$3.37	\$3.77	\$4.17

ASSESSMENT DISTRICT: 25

T.A.I.:	1	2	3	4	5	6	7	8	9
GROSS INC/SF:	\$2.00	\$2.60	\$3.24	\$3.97	\$4.76	\$5.62	\$6.48	\$7.65	\$8.91
STD EXP (%)	21%	21%	21%	21%	21%	21%	21%	21%	21%
NET INC/SF:	\$1.58	\$2.05	\$2.56	\$3.14	\$3.76	\$4.44	\$5.12	\$6.04	\$7.04

STANDARD INCOME TABLES FOR APARTMENTS
 OCC# 10-12, 25-27, 101-107, 111-115, 123-129

EXPENSE 2	60.0%	55.0%	50.0%	47.5%	45.0%	42.5%	40.0%	37.5%	35.0%
-----------	-------	-------	-------	-------	-------	-------	-------	-------	-------

ASSESSMENT DISTRICT: 5, 7, 10, 13, 15, 20

T.A.I.:	1	2	3	4	5	6	7	8	9
0 BR YR RENT	\$1,419	\$2,100	\$2,907	\$3,277	\$3,640	\$4,118	\$4,620	\$5,010	\$5,400
0BR MO RENT	\$118	\$175	\$242	\$273	\$303	\$343	\$385	\$418	\$450
1 BR YR RENT	\$1,763	\$2,550	\$3,477	\$3,842	\$4,200	\$4,872	\$5,580	\$5,970	\$6,360
1 BR MO RENT	\$147	\$213	\$290	\$320	\$350	\$406	\$465	\$498	\$530
2 BR YR RENT	\$2,064	\$3,050	\$4,218	\$4,774	\$5,320	\$6,003	\$6,720	\$7,260	\$7,800
2 BR MO RENT	\$172	\$254	\$352	\$398	\$443	\$500	\$560	\$605	\$650
3 BR YR RENT	\$2,408	\$3,575	\$4,959	\$5,622	\$6,272	\$7,076	\$7,920	\$8,550	\$9,180
3 BR MO RENT	\$201	\$298	\$413	\$468	\$523	\$590	\$660	\$713	\$765
4 BR YR RENT	\$2,795	\$4,150	\$5,757	\$6,526	\$7,280	\$8,207	\$9,180	\$9,900	\$10,620
4 BR MO RENT	\$233	\$346	\$480	\$544	\$607	\$684	\$765	\$825	\$885

ASSESSMENT DISTRICT: 25

T.A.I.:	1	2	3	4	5	6	7	8	9
0 BR YR RENT	\$1,815	\$3,003	\$4,488	\$5,017	\$5,525	\$6,142	\$6,776	\$7,599	\$8,460
0BR MO RENT	\$151	\$250	\$374	\$418	\$460	\$512	\$565	\$633	\$705
1 BR YR RENT	\$2,255	\$3,647	\$5,368	\$5,882	\$6,375	\$7,266	\$8,184	\$9,055	\$9,964
1 BR MO RENT	\$188	\$304	\$447	\$490	\$531	\$606	\$682	\$755	\$830
2 BR YR RENT	\$2,640	\$4,362	\$6,512	\$7,309	\$8,075	\$9,553	\$9,856	\$11,011	\$12,220
2 BR MO RENT	\$220	\$363	\$543	\$609	\$673	\$746	\$821	\$918	\$1,018
3 BR YR RENT	\$3,080	\$5,112	\$7,656	\$8,607	\$9,520	\$10,553	\$11,616	\$12,968	\$14,382
3 BR MO RENT	\$257	\$426	\$638	\$717	\$793	\$879	\$968	\$1,081	\$1,199
4 BR YR RENT	\$3,575	\$5,935	\$8,888	\$9,991	\$11,050	\$12,240	\$13,464	\$15,015	\$16,638
4 BR MO RENT	\$298	\$495	\$741	\$833	\$921	\$1,020	\$1,122	\$1,251	\$1,387

ASSESSMENT DISTRICT: 30, 35, 40

T.A.I.:	1	2	3	4	5	6	7	8	9
0 BR YR RENT	\$1,749	\$2,793	\$4,080	\$4,640	\$5,200	\$5,680	\$6,160	\$6,680	\$7,200
0BR MO RENT	\$146	\$233	\$340	\$387	\$433	\$473	\$513	\$557	\$600
1 BR YR RENT	\$2,173	\$3,392	\$4,880	\$5,440	\$6,000	\$6,720	\$7,440	\$7,960	\$8,480
1 BR MO RENT	\$181	\$283	\$407	\$453	\$500	\$560	\$620	\$663	\$707
2 BR YR RENT	\$2,544	\$4,057	\$5,920	\$6,760	\$7,600	\$8,280	\$8,960	\$9,680	\$10,400
2 BR MO RENT	\$212	\$338	\$493	\$563	\$633	\$690	\$747	\$807	\$867
3 BR YR RENT	\$2,968	\$4,755	\$6,960	\$7,960	\$8,960	\$9,760	\$10,560	\$11,400	\$12,240
3 BR MO RENT	\$247	\$396	\$580	\$663	\$747	\$813	\$880	\$950	\$1,020
4 BR YR RENT	\$3,445	\$5,520	\$8,080	\$9,240	\$10,400	\$11,320	\$12,240	\$13,200	\$14,160
4 BR MO RENT	\$287	\$460	\$673	\$770	\$867	\$943	\$1,020	\$1,100	\$1,180

TENANT APPEAL INDEX

The T.A.I. is a "quality rating" system that is used in the Income Valuation section, to relate an appropriate market rent to a specific property or rentable space. It is based on the CONDITION-DESIRABILITY-USEFULNESS-LOCATION of the property. The TAI range (1-9) is applicable to, or within, each Commercial Assessment district.

TAI 9: "EXCELLENT"

- * The rentable space and the building is new and highly desirable, and will command the top dollar rent;
- * Best quality construction, designed for first-class tenants;
- * The building amenities and services are extensive and first rate;
- * No evidence of physical deterioration;
- * The location is considered to be the most desirable in the Assessment district, for the intended property use;

TAI 8: "VERY GOOD"

- * The space is close to "best quality", but may be slightly older, or not quite as lavish;
- * The building is very well-maintained; the amenities and services are excellent;
- * The location is very good, almost choice;

TAI 7: "GOOD"

- * Space is very modern and desirable;
- * Location is good;
- * Building is of very good construction;
- * Building may be older but has had extensive rehabilitation.
- * Minor wear may be visible;

TAI 6: "GOOD/AVERAGE"

- * Space is desirable and considered better than average;
- * Location is average;
- * The building may have had partial renovation, and the area or floor that has been modernized warrants a higher TAI than non-renovated area;

TAI 5: "AVERAGE"

- * The quality and condition of the space (or building) is typical of the majority of properties in the area;
- * The location is considered average, having the same locational amenities as most of the properties in the area;
- * The building shows normal physical deterioration according to the building age and there are no obvious functional deficiencies;

TAI 4 "FAIR"

- * The condition of the space has deteriorated over time, and has not been modernized at all;
- * Building service and amenities are limited;
- * Tenants may have been there many years, and are paying below-market rents;
- * The location is only fair-to-average, possibly an area that is experiencing a decline in value;

TAI 3: "SUBSTANDARD"

- * The space (or building) is either substandard by construction, or has experienced much more than normal deterioration, or suffers from some significant functional/economic problem;
- * The expected vacancy rate will be high; and the rental rate will be at the lowest end of the rental range;
- * Building service and amenities may be non-existent;
- * The location is considered only fair;

TAI 2: "POOR"

- * The building or space is barely rentable, and typically only to a low-volume, low-visibility tenant (e.g. dead storage);
- * The building may be mostly vacant;
- * The building is in poor condition and suffers from much physical and functional obsolescence; and is approaching "unsound" condition;
- * The location is considered fair to poor;

TAI 1: "UNRENTABLE"

- * The building or space suffers from some severe problem(s); physical, functional or economic, which cause the space to be unuseable and therefore unrentable, by market standards;
- * The building may be just a "shell";
- * The location is not a factor in this case;

Development

FY 89

MORTGAGE EQUITY ANALYSIS

PROPERTY TYPE OFFICE

GIVEN ASSUMPTIONS

LOAN TO VALUE RATIO 70%
 LOAN TERM-YRS 25
 HOLDING PERIOD-YRS 10
 MORTGAGE INTERST 11.8%
 EQUITY YIELD 13.6%
 APPRECIATION OVER THE
 HOLDING PERIOD 75%

BUILT-UP METHOD

	a		Ra	EFFECTIVE
LOAN RATIO	X	ANNUAL	LOAN	
		CONSTANT	RATE	
70%		12.4%		8.6923%
	1-a		Ye	
EQUITY RATIO	X	EQUITY		
		YIELD		
30%		13.6%		4.0800%

		WIEGHTED AVERAGE		12.7723%

EQUITY BUILTUP

(a) (P) (1/SFF)
 (LOAN RATIO) LOAN Z
 PAID OFF

70% 12.6112% 5.272998% 0.4655%

BASIC RATE 12.3068%

APPRECIATION X 1/SFF

75% 5.2730% 3.9547%

OVERALL RATE-Ro 8.3521%

EFFECTIVE TAX RATE 2.1450%

SOURCE:
 CITY OF BOSTON-ASSESSING DEPT.
 VALUATION UNIT

OVERALL RATE 10.4971%

ROUNDED 10.5%

FY 89

MORTGAGE EQUITY ANALYSIS

PROPERTY TYPE RETAIL

GIVEN ASSUMPTIONS

LOAN TO VALUE RATIO 70%
LOAN TERM-YRS 25
HOLDING PERIOD-YRS 10
MORTGAGE INTERST 12.5%
EQUITY YIELD 14.0%
APPRECIATION OVER THE
HOLDING PERIOD 75%

BUILT-UP METHOD

	$\frac{R_a}{1 - \frac{R_a}{Y_e}}$			
LOAN RATIO	X	ANNUAL	EFFECTIVE	
		CONSTANT	LOAN	
70%			RATE	
				13.1% 9.1590%
	$\frac{1 - \frac{R_a}{Y_e}}{Y_e}$			
EQUITY RATIO	X	EQUITY		
		YIELD		
30%				14.0% 4.2000%

		WIEGHTED AVERAGE		13.3590%

EQUITY BUILTUP

(M) (P) (1/SFF)
(LOAN RATIO) LOAN %
PAID OFF

70% 11.5347% 5.171354% 0.4176%

BASIC RATE 12.9414%

APPRECIATION X 1/SFF

75% 5.1714% 3.8785%

OVERALL RATE-Ro 9.0629%

EFFECTIVE TAX RATE 2.1450%

SOURCE:
CITY OF BOSTON-ASSESSING DEPT
VALUATION UNIT

OVERALL RATE 11.2079%

ROUNDED 11.2%

FY 89

MORTGAGE EQUITY ANALYSIS

PROPERTY TYPE INDUSTRIAL

GIVEN ASSUMPTIONS

LOAN TO VALUE RATIO 70%

LOAN TERM-YRS 30

HOLDING PERIOD-YRS 10

MORTGAGE INTERST 13.0%

EQUITY YIELD 14.9%

APPRECIATION OVER THE
HOLDING PERIOD 50%

BUILT-UP METHOD

$\frac{L}{V}$	\times	R_m	EFFECTIVE
LOAN RATIO		ANNUAL	LOAN
		CONSTANT	RATE
70%		13.3%	9.2921%

$\frac{1-L}{V_e}$	\times	Y_e	
EQUITY RATIO		EQUITY	
		YIELD	
30%		14.9%	4.4700%

WIEGHTED AVERAGE 13.7621%

EQUITY BUILDUP

($\frac{L}{V}$)	(P)	(1/SFF)	
(LOAN RATIO)	LOAN %		
	PAID OFF		
70%	5.5802%	4.949317%	0.1933%

BASIC RATE 13.5687%

APPRECIATION	\times	1/SFF	
50%		4.9493%	2.4747%

OVERALL RATE- R_o 11.0941%

EFFECTIVE TAX RATE 2.1450%

SOURCE:
CITY OF BOSTON-ASSESSING DEPT.
VALUATION UNIT

OVERALL RATE 13.2391%

ROUNDED 13.2%

FY 89

MORTGAGE EQUITY ANALYSIS

PROPERTY TYPE APARTMENTS

GIVEN ASSUMPTIONS

LOAN TO VALUE RATIO 75%

LOAN TERM-YRS 25

HOLDING PERIOD-YRS 10

- MORTGAGE INTERST 11.3%

EQUITY YIELD 13.0%

APPRECIATION OVER THE
HOLDING PERIOD 100%

BUILT-UP METHOD

$\frac{m}{1-m}$	\times	$\frac{R_m}{1-R_m}$	EFFECTIVE
LOAN RATIO		ANNUAL	LOAN
		CONSTANT	RATE
75%		12.0%	9.0169%

$\frac{1-m}{1-m}$	\times	$\frac{Y_e}{1-Y_e}$	
EQUITY RATIO		EQUITY	
		YIELD	
25%		13.0%	3.2500%

WIESHTED AVERAGE	12.2669%
------------------	----------

EQUITY BUILDUP

(a) (P) (1/SFF)

(LOAN RATIO) LOAN %

PAID OFF

75%	13.2954%	5.428956%	0.5413%
-----	----------	-----------	---------

BASIC RATE	11.7255%
------------	----------

APPRECIATION \times 1/SFF

100%	5.4290%	5.4290%
------	---------	---------

OVERALL RATE- R_o	6.2966%
---------------------	---------

EFFECTIVE TAX RATE	0.7920%
--------------------	---------

SOURCE:
CITY OF BOSTON-ASSESSING DEPT.
VALUATION UNIT

OVERALL RATE	7.0386%
--------------	---------

ROUNDED	7.1%
---------	------

FY 89 MORTGAGE EQUITY ANALYSIS

PROPERTY TYPE HOTEL/MOTEL

GIVEN ASSUMPTIONS

LOAN TO VALUE RATIO 66%

LOAN TERM-YRS 30

HOLDING PERIOD-YRS 10

MORTGAGE INTERST 12.5%

EQUITY YIELD 16.5%

APPRECIATION OVER THE
HOLDING PERIOD 50%

BUILT-UP METHOD

$\frac{m}{n}$	$\frac{R_m}{X}$	EFFECTIVE
LOAN RATIO	ANNUAL	LOAN
	CONSTANT	RATE
66%	12.8071%	8.4527%

$\frac{1-m}{n}$	$\frac{Y_e}{X}$	
EQUITY RATIO	EQUITY	
	YIELD	
34%	17%	5.6100%

WIEGHTED AVERAGE 14.0627%

EQUITY BUILTUP

(m)	(P)	(1/SFF)
(LOAN RATIO)	LOAN %	
	PAID OFF	
66%	5.0629%	4.576578%
		0.1831%

BASIC RATE 13.8795%

APPRECIATION	X	1/SFF
50%		4.5766%
		2.2883%

OVERALL RATE-R₀ 11.5913%

EFFECTIVE TAX RATE 2.1450%

SOURCE:
CITY OF BOSTON-ASSESSING DEPT.
VALUATION UNIT

OVERALL RATE 13.7363%

ROUNDED 13.7%

CITY OF BOSTON

FY89

COMMERCIAL COST RATES

OCCUPANCY CODE 325

RETAIL STORE DETACH

AREA SQ FT	3	4	5	6	7	8	9	10	11	12
1000	33.46	38.93	44.41	49.88	55.36	60.83	66.30	71.78	77.25	82.73
2000	32.82	38.19	43.56	48.93	54.30	59.67	65.04	70.41	75.78	81.15
4000	31.77	36.97	42.16	47.36	52.56	57.76	62.96	68.16	73.36	78.55
6000	30.63	35.64	40.65	45.67	50.68	55.69	60.70	65.71	70.73	75.74
8000	29.53	34.38	39.19	44.03	48.88	53.89	58.52	63.35	68.19	73.02
10000	28.39	33.03	37.68	42.32	46.97	51.61	56.25	60.90	65.54	70.19
15000	27.54	32.05	36.56	41.07	45.57	50.08	54.59	59.09	63.60	68.11

OCCUPANCY CODE 326

RESTAURANT

AREA SQ FT	3	4	5	6	7	8	9	10	11	12
2000	57.90	65.62	73.34	81.06	88.78	96.50	105.19	113.87	122.56	131.24
3000	56.11	63.59	71.08	78.56	86.04	93.52	101.94	110.35	118.77	127.19
4000	54.28	61.52	68.76	75.99	83.23	90.47	98.61	106.75	114.90	123.04
5000	52.49	59.49	66.49	73.49	80.49	87.49	95.36	103.24	111.11	118.99
6000	51.63	58.51	65.40	72.28	79.17	86.05	93.79	101.54	109.28	117.03
8000	49.95	56.61	63.27	69.93	76.59	83.25	90.74	98.24	105.73	113.22
(3	48.28	54.71	61.15	67.59	74.02	80.46	87.70	94.94	102.18	109.43

OCCUPANCY CODE 327

RESTAURANT / LOUNGE

AREA SQ FT	3	4	5	6	7	8	9	10	11	12
3000	70.00	76.00	82.00	88.00	94.00	100.00	110.00	120.00	130.00	140.00
4000	67.80	73.61	79.42	85.23	91.04	96.85	106.54	116.22	125.91	135.59
5000	65.61	71.23	76.86	82.48	88.11	93.73	103.10	112.48	121.85	131.22
6000	64.57	70.10	75.64	81.17	86.71	92.24	101.46	110.69	119.91	129.14
8000	62.52	67.88	73.24	78.60	83.96	89.32	98.25	107.18	116.12	125.05
10000	60.49	65.68	70.86	76.05	81.23	86.42	95.06	103.70	112.35	120.99

OCCUPANCY CODE 342

MEDICAL OFFICE

AREA SQ FT	3	4	* P 5	O I 6	N T 7	R A 8	N G 9	E * 10	11	12
4000	68.52	80.43	92.34	104.25	116.16	128.07	140.56	169.05	189.54	210.03
6000	63.20	74.19	85.18	96.17	107.15	118.14	137.04	155.94	174.85	193.75
8000	60.72	71.28	81.83	92.39	102.94	113.50	131.66	149.82	167.98	186.14
10000	59.87	69.34	79.61	89.67	100.14	110.41	128.08	145.74	163.41	181.07
20000	55.93	65.65	75.37	85.10	94.82	104.54	121.27	137.99	154.72	171.45
40000	51.50	60.45	69.40	78.36	87.31	96.26	111.66	127.06	142.46	157.87
60000	49.08	57.61	66.14	74.68	83.21	91.74	106.42	121.10	135.78	150.45

OCCUPANCY CODE 343

OFFICE 1-2 STORY

AREA SQ FT	3	4	* P 5	O I 6	N T 7	R A 8	N G 9	E * 10	11	12
2000	45.82	53.17	60.52	67.86	75.21	82.56	94.94	107.33	119.71	132.10
3000	44.83	52.02	59.21	66.40	73.59	80.78	92.90	105.01	117.13	129.25
4000	43.23	50.17	57.10	64.03	70.97	77.90	89.59	101.27	112.96	124.64
6000	40.90	47.46	54.02	60.58	67.14	73.70	84.76	95.81	106.87	117.92
8000	39.56	45.90	52.25	58.59	64.94	71.28	81.97	92.66	103.36	114.05
10000	38.24	44.37	50.50	56.64	62.77	68.90	79.24	89.57	99.91	110.24
12000	36.61	42.48	48.35	54.22	60.09	65.96	75.85	85.75	95.64	105.54

OCCUPANCY CODE 344

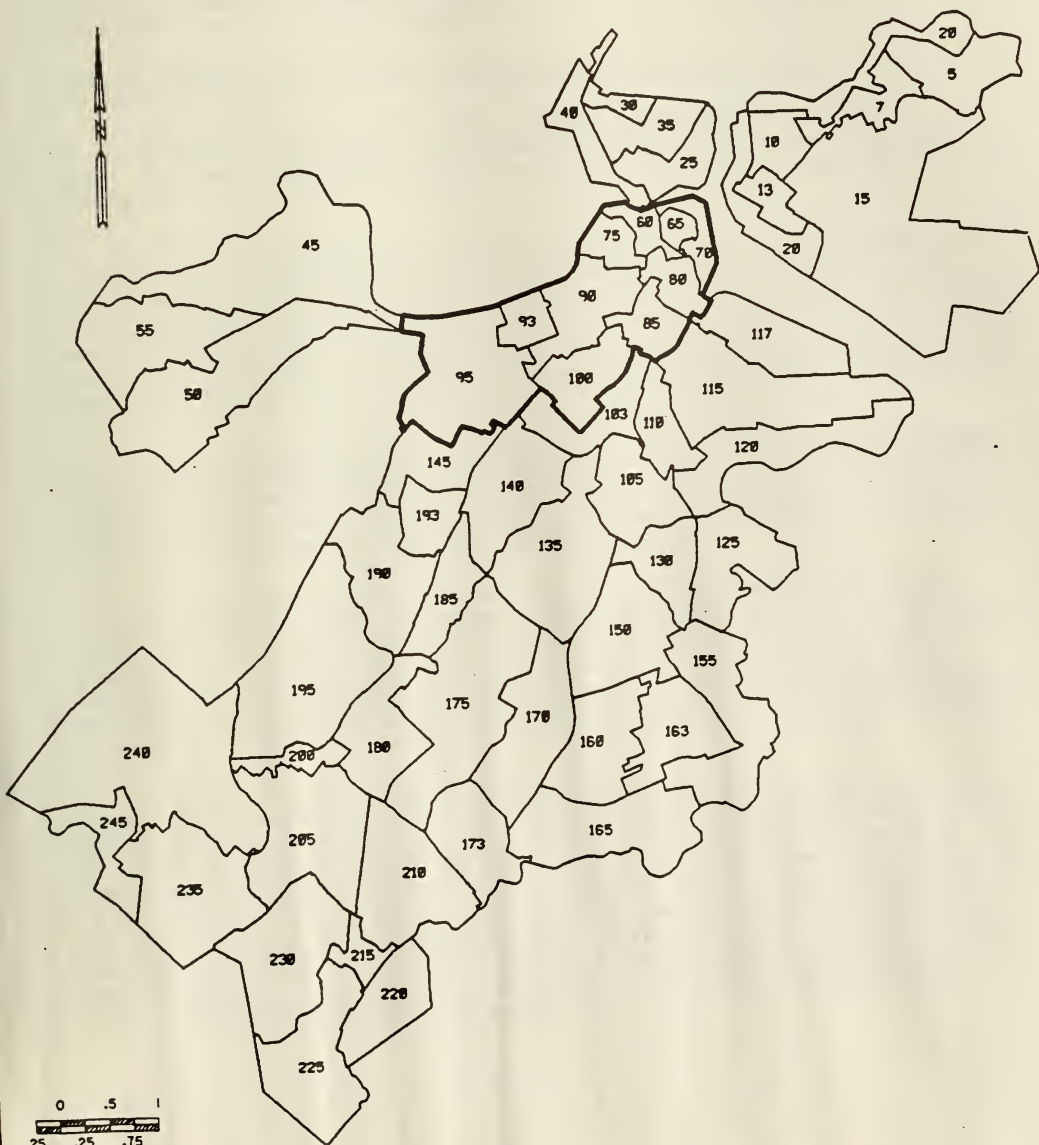
OFFICE 3-9 STORY

AREA SQ FT	3	4	* P 5	O I 6	N T 7	R A 8	N G 9	E * 10	11	12
10000	63.90	69.12	74.34	79.56	84.78	90.00	106.20	122.40	138.60	154.80
20000	60.68	65.64	70.60	75.56	80.51	85.47	100.85	116.24	131.62	147.01
40000	55.88	60.44	65.01	69.57	74.14	78.70	92.87	107.03	121.20	135.36
60000	53.25	57.60	61.95	66.38	70.65	75.00	88.50	102.00	115.50	129.00
80000	51.12	55.30	59.47	63.65	67.82	72.00	84.96	97.92	110.88	123.84
100000	49.74	53.80	57.86	61.92	65.99	70.05	82.66	95.27	107.88	120.49
120000	48.72	52.70	56.68	60.66	64.64	68.62	80.97	93.32	105.67	118.03

DEPRECIATION TABLE (expressed as %-GOOD Residual Value)

YEAR BUILT (Actual)	EFF AGE (years)	3/4 pts	** QUALITY 5 pts	6 pts	POINT 7/8 pts	RANGE ** 9 pts	10 pts	11/12 pts
1988 - NEW CONSTRUCTION								
1987	1	99	99	99	99	99	100	100
1986	2	98	98	98	98	98	99	99
1985	3	96	97	97	97	98	99	99
1984	4	94	96	96	96	97	98	98
1983	5	93	95	95	95	96	97	97
1982	6	92	94	94	94	95	97	97
1981	7	90	93	93	93	94	96	96
1980	8	89	92	92	92	93	95	95
1979	9	87	90	90	91	92	94	94
1978	10	85	88	88	90	90	93	93
1977	11	84	85	86	88	90	92	92
1976	12	82	85	85	86	88	90	92
1975	13	80	83	84	85	87	90	91
1974	14	78	82	83	84	86	88	90
1973	15	75	80	82	83	85	88	90
1972	16	75	80	82	82	84	86	88
1971	17	73	78	80	81	84	86	88
1970	18	70	75	78	80	82	84	86
1969	19	70	74	76	78	80	83	86
1968	20	68	72	75	77	79	82	84
1967	21	66	70	74	76	78	80	84
1966	22	64	68	72	75	77	80	82
1965	23	64	68	72	74	76	78	80
1964	24	62	66	70	72	74	76	78
1963	25	60	65	68	70	72	74	76
1962	26	56	62	65	68	71	73	76
1961	27	55	60	64	66	69	72	74
1960	28	50	56	62	64	66	70	72
1959	29	50	54	60	62	64	68	70
1958	30	48	52	58	60	62	66	68
1957	31	46	50	56	58	60	64	68
1955-1956	32	44	50	54	57	60	64	67
1953-1954	34	42	48	52	55	58	62	65
1951-1952	36	40	45	50	53	56	61	63
1949-1950	38	38	44	48	50	54	58	60
1944-1948	40	35	40	46	48	52	56	59
1939-1943	45	30	38	44	46	48	52	55
1934-1938	50	25	34	40	44	45	48	50
1929-1933	55	25	32	35	40	40	42	45
1924-1928	60	20	30	30	35	35	38	40
PRE -1923	65	20	25	25	30	30	32	35

CITY OF BOSTON
Assessing Department
COMMERCIAL ASSESSING DISTRICTS



Formal quality control responsibilities and procedures have been established and carried out for the FY 1989 revaluation - - and will be continued as an on-going function within the Assessing Department. The quality control work includes two phases: (1) testing the quality of data collection on commercial and industrial property by the city's contractor, R. M. Bradley Company, and (2) testing the quality of field inspection and data collection done internally for assessment maintenance purposes - - e.g., sales, new condo's, appendas, permits, etc. These two phases are discussed separately in the following material.

Quality Control (QC) on Data Collection by R. M. Bradley (RMB)

The procedure for testing the quality of data collection by R. M. Bradley is described in the attached instructions. Some highlights about the procedure and the quality control results are outlined in the following.

(1) As indicated in the procedure, the principal basis for testing the quality of data collection was to compare the total indicated value using R.M.B. data with the total indicated value using QC data, for the test sample of properties. This automatically reflects the appropriate influence of any and all of the property characteristic items. Additionally, comparative data was identified about differences in the characteristics items, to determine if there were any particular patterns of differences or problems.

(2) In carrying out the quality control work, the department assigned its most experienced and qualified appraisers. These included two senior appraisers in charge of the work and four experienced appraisers to conduct the field inspections. Quality control tests were conducted at a rate of about 60 parcels per week for each two-man QC team.

(3) The sample for testing was made up of approximately 10% of the parcels collected. This initially included two parts: (a) a strictly random sample of every 10th - 15th parcel, and (b) parcels where the R.M.B. data generated a total value more than 20% different from the existing value (specifically to test cases with major changes). The second sample category was discontinued about mid-way through the project, since the types of major corrections proved to be obvious and accurate.

(4) The quality control procedures and evaluation indicated that the overall performance of the R. M. Bradley staff was very good and acceptable. Some measurement problems were identified in Wards 6, 8 and 14, and were corrected by recollection of the data by R. M. Bradley. Some problems or questions about the determination of the tenant appeal index were identified in Wards 12, 13, 14, 15 and 18. As a result, two of our senior appraisers reviewed the TAI's on all commercial and industrial parcels in these wards, and made corrections that were necessary to assure accuracy and consistency in the TAI element. Other variances or questions that were identified were within acceptable performance tolerances.

The table below presents a summary of the QC results. This shows the TAI issue that was indicated above.

Quality Control on Data Collection
of Commercial and Industrial Property
by R. M. Bradley

Ward	No. of C & I Parcels	Sample Size	Variance in Value More than 10%		Causes of Variances				0 N
			No.	% of Total	T.A.I.		G.F.A.		
					No.	% of Total	No.	% of Total	
1	978	121	21	17.4%	7	5.8%	10	8.3%	
2	382	98	7	7.1	3	3.1	2	2.0	
6	1145	108	22	20.4	7	6.5	11	10.2	
7	519	88	16	18.2	11	12.5	5	5.7	
8	760	36	9	25.0	6	16.7	2	5.6	
9	428	30	8	26.7	3	10.0	-	-	
10	260	24	3	12.5	1	4.2	2	8.3	
11	435	61	17	27.9	8	13.1	5	8.2	
12	359	27	10	37.0	7	25.9	-	-	
13	221	17	5	29.4	3	17.6	2	11.8	
14	500	59	20	33.9	13	22.0	5	8.5	
15	371	27	14	51.9	8	29.6	4	14.8	
16	469	22	4	18.2	2	9.1	2	9.1	
17	339	30	7	23.3	1	3.3	-	-	
18	861	64	22	34.4	11	17.2	11	17.2	
19	366	24	6	25.0	2	8.3	2	8.3	
20	519	31	8	25.8	4	12.9	4	12.9	
21	847	42	11	26.2	4	9.5	4	9.5	
22	693	59	6	10.2	5	8.5	-	-	

Internal Quality Control

The internal quality control monitoring was established on the recommendation of Cole-Layer-Trumble (C.L.T.) after the fiscal 1986 revaluation. This deals with testing the accuracy of field inspections and data update for changes in property characteristics that are occasioned by sales, new condo's, appendas, permits, demolitions, etc. The procedures and work flow were implemented on the same basis as those established for the contractual services, although it applies to both residential and commercial/industrial properties.

The staff consists of a senior appraiser and two assessors, whose prime responsibility is to ensure accuracy and consistency of the data and to identify areas of collection which may be posing problems for the valuation staff.

The Quality Control Unit, formerly Audit, is responsible for obtaining a five percent (5%) random sample of all parcels processed on a weekly basis. The original and a copy of the appraisal work sheets are then forwarded to the senior appraiser who prepares the work for field inspection.

Upon completion of field inspection by the quality control team, the senior appraiser tracks those parcels which have collection errors by appraiser I.D. number. This enables the valuation unit to quickly identify problem areas of the appraisal staff.

The original and copied appraisal work sheets are then returned to the Quality Control Unit and forwarded to Data Management. All of the original cards are entered first and a value listing is generated. The same process is then applied to the quality control cards. The "before" and "after" value listings along with all the cards are then forwarded to the senior appraiser for valuation analysis. Again, for the purposes of value impact generated by changes, or correction errors, a ten percent (10%) increase/decrease is flagged.

The following is a summary of internal quality control results:

Commercial: 29 parcels
5 parcels with corrections or changes resulting in a 10% value change.

Residential: 258 parcels
10 parcels (+/-) 10% value change.

As indicated above, the overall data collection performance is very good. The variances identified on commercial parcels deal with measurement problems, and the assistant assessor involved has been given additional instruction.

APPENDIX II

QUALITY CONTROL PROCEDURES

FOR APARTMENT, COMMERCIAL & INDUSTRIAL DATA COLLECTION

FOR FY'89 REVALUATION

Purpose and Scope of Data Quality Control

This procedure is designed for testing/control of the quality of property characteristics information that is collected on apartment, commercial and industrial property by the Commercial Data Collection Contractor. It is a specified element in the request for proposal and in the contractor agreement covering the collection of property data on the designated parcels in these classes of property. It is supplemented by a matching procedure that provides for testing/control of the quality of property characteristics data on parcels of property that are collected by the Assessing Department. In these ways, the City of Boston will be assured of having an accurate base of property data for use in establishing assessed values.

The contract request for proposal states that data quality controls will include sampled recollection of parcels, computer data entry edits, statistical monitoring and analysis, and comparisons to the existing property characteristic data base. These are provided for in this procedure.

Overview of Quality Control Procedures

Data quality control is an assigned responsibility of the Audit Unit in the Valuation Section of The Assessing Department. It is an on-going function, equally applicable to (a) the regular assessment maintenance work that accounts for changes in property characteristics, and (b) the process of collecting property data for a periodic revaluation.

The overriding feature of the quality control procedure is that it will essentially consist of independently recollecting data for a meaningful sample of parcels (at least 10%), and making a comparative analysis of this data with the data collected for these parcels by the contractor. With these data and comparative analyses, the Department will identify patterns of strengths and weaknesses (errors) that exist in the data collection process and staff, and will take appropriate action to correct the weaknesses that show up.

The major elements or steps of the procedure are outlined in the following summary, dealing with selection of the sample, field inspection and recollection of data, comparison of test data with contractor data, analysis and reporting of quality test results.

- (1) The test sample will consist of two segments, which will be selected weekly from the preceding week's work. First, a random selection of 10% of the parcels collected will be identified, and adjusted as necessary to assure that the sample covers all data collectors, all classes and principal occupancies, and all commercial assessment districts.

APPENDIX II

QUALITY CONTROL PROCEDURES

FOR APARTMENT, COMMERCIAL & INDUSTRIAL DATA COLLECTION

FOR FY'89 REVALUATION

Purpose and Scope of Data Quality Control

This procedure is designed for testing/control of the quality of property characteristics information that is collected on apartment, commercial and industrial property by the Commercial Data Collection Contractor. It is a specified element in the request for proposal and in the contractor agreement covering the collection of property data on the designated parcels in these classes of property. It is supplemented by a matching procedure that provides for testing/control of the quality of property characteristics data on parcels of property that are collected by the Assessing Department. In these ways, the City of Boston will be assured of having an accurate base of property data for use in establishing assessed values.

The contract request for proposal states that data quality controls will include sampled recollection of parcels, computer data entry edits, statistical monitoring and analysis, and comparisons to the existing property characteristic data base. These are provided for in this procedure.

Overview of Quality Control Procedures

Data quality control is an assigned responsibility of the Audit Unit in the Valuation Section of The Assessing Department. It is an on-going function, equally applicable to (a) the regular assessment maintenance work that accounts for changes in property characteristics, and (b) the process of collecting property data for a periodic revaluation.

The overriding feature of the quality control procedure is that it will essentially consist of independently recollecting data for a meaningful sample of parcels (at least 10%), and making a comparative analysis of this data with the data collected for these parcels by the contractor. With these data and comparative analyses, the Department will identify patterns of strengths and weaknesses (errors) that exist in the data collection process and staff, and will take appropriate action to correct the weaknesses that show up.

The major elements or steps of the procedure are outlined in the following summary, dealing with selection of the sample, field inspection and recollection of data, comparison of test data with contractor data, analysis and reporting of quality test results.

- (1) The test sample will consist of two segments, which will be selected weekly from the preceding week's work. First, a random selection of 10% of the parcels collected will be identified, and adjusted as necessary to assure that the sample covers all data collectors, all classes and principal occupancies, and all commercial assessment districts.

Second, a specific or selective group of parcels will be identified for recollection, to include those parcels where changes in characteristics reported by the data collectors cause the indicated value to increase or decrease by more than 20%.

- (2) The field inspection and recollection of data by the Quality Control (QC) staff will be carried out with documents and procedures that are similar to those used by the contract data collectors. Thus, for the test sample, the QC staff will have copies of the appraisal work sheets and building sketches, and will record any changes/corrections that are called for in any of the data elements. The QC staff also will gather information and complete the Market Data Field Sheet for the parcels they are recollecting.
- (3) The quality check or data comparison will consist of two major points or items of comparison between the information on the appraisal work sheets completed by the contractor data collectors and by the QC staff. The first quality check will identify differences (errors) in the individual data elements. The comparative data from the two separate appraisal work sheets will be recorded on a quality control comparison sheet for each of the test parcels. A summary of such differences for a group of parcels will indicate the frequency of differences for any individual elements or for any data collectors or team. This will indicate a pattern of errors that need to be corrected.

The second quality check will measure the magnitude or impact on value of the errors that are identified. Because of differences in influence on value among the different data elements, this measurement of the magnitude of errors will be made by comparing the total indicated value from the appraisal work sheets completed by the contractor data collectors and by the QC staff, respectively. These quality checks and comparisons will be done by the QC team supervisor, with the value calculations made by MIS.

- (4) The results of the quality tests, with appropriate analysis and recommendations for improvements, will be reported on a regular weekly basis, by the Manager of the Audit Unit to the contractor and to the Director of Operations. This will identify problems and corrective actions in terms of individual data collectors and the interpretation or handling of individual data elements. If errors persist for any data collection team where the difference in indicated values exceeds 10% in more than 20% of the sample, it will be necessary to require that entire batches be collected a second time under closer supervision.
- (5) It is anticipated that the quality control work will be carried out by two QC teams, each composed of one supervisor and two assistant assessors. These teams will alternate in conducting quality tests on parcels that are data collected by the contractor and parcels that are data collected by the Department. The quality control work for the contractor will continue for the duration of the data collection contract. Quality control for Assessing Department maintenance work is a permanent on-going function.

Selection of the Test Sample

At the outset, the Audit Unit will have an inventory/count of Apartments, Commercial and Industrial parcels, by Class and Occupancy, by Ward, by Commercial Assessment District, which will provide the basis for overall control to assure that the QC sample adequately covers the respective uses and locations of the A-C-I properties. Additionally, the Audit Unit will have a record of parcel assignments for each contractor data collection team.

The Audit Unit then, will receive the completed appraisal work sheets from the contractor, in appropriate size and sequence batches. With this information and material, the Audit Unit will be able to select the specific sample of parcels to be recollected.

Essentially, the test sample will be selected, and the recollection/testing will be managed, on a weekly basis. The weekly sample will be selected to represent 10% of the parcels assigned to each contractor data collection team for the week. On a schedule for each team to collect 55-60 parcels per week, the test sample would be identified by selecting every 10th parcel from the team's list of assigned parcels. With ten teams, the average weekly sample would include 60 parcels. The Audit Unit will review the composition of the test sample for all teams, to assure proper test coverage by class and principal occupancy groups, and may substitute alternative test parcels as may be required.

By selecting the sample from the work of each data collection team each week, the sample will automatically cover all data collectors and all locations (Wards and CAD's). During the early stages of the data collection work, the test sample will be selected from the record of assigned parcels without waiting for the parcels to be processed through Data Entry and Valuation. This will provide for getting an earlier initial evaluation of the work at the start-up time. As the work proceeds, the test sample may be selected from the work completed and turned in by the respective data collection teams after it is processed through Data Entry and Valuation.

A second sample for recollection/testing will be selected, again weekly, to include all parcels where changes in the characteristics reported cause the indicated value to increase or decrease by more than 20%. This sample obviously will be identified after the parcels are processed through Data Entry and Valuation. The Audit Unit, in establishing the final weekly test samples, may replace some of the initial random sample with these major change cases, but no more than half of the random sample for any collection team.

Quality Test Procedural Steps

The procedural steps for data quality testing are best described in terms of four major phases of the work: (1) the organization and preparation of documents for parcels to be tested, (2) the field inspection and data recollection for the designated parcels, (3) the comparison of property characteristics data for the designated parcels reported by the contractor data collectors and by the QC staff, and (4) the analysis and reporting of quality test results to the contractor and internally to the Director of Operations.

As indicated previously, the quality testing work, and each of the major phases, will be carried out and accounted for on a weekly schedule or cycle.

The organization and preparation of documents for parcels to be tested will be done by the office staff of the Audit Unit. The documentation for each test parcel will be a duplicate of the documentation that was furnished to the contractor. This phase of the work will include two principal elements. First, the Audit Unit will prepare a list of the test sample parcels for each data collection team, showing the parcel ID and class. The test parcels will be every 10th parcel in the week's assignment for each collection team, and/or will include parcels where a change of more than 20% in indicated value is estimated. The second step, then, is for the Audit Unit to get from Data Management copies of the appraisal work sheets (Commercial Value Review Cards) and sketches for each of the test parcels. This parcel documentation for the week's work will be furnished to the QC team supervisor for scheduling the field work.

The field inspection and data recollection for the test parcels will be done by the quality control (QC) team (s) of the Audit Unit. The QC teams will consist of one supervisor and two assistant assessors.

The field work will be done by the two assistant assessors as a team. The supervisor will review the work products of the assistant assessors, and will reinspect a sample of the test parcels. The field work for each test parcel will include (a) contacting the building manager or tenant to inspect the building, to get information about the performance of the contractor data collectors, and to gather information and complete the Market Data Field Sheet for the test parcel, and (b) checking each data element or item on the appraisal work sheet and recording corrections that are required. The completed appraisal work sheets will be turned in or picked up by the supervisor at least every other day.

The comparison of data collected by the contractor data collectors with the data collected by the QC staff will be done by the QC supervisor. (S)He will pull the appraisal work sheet completed by the contractor data collector to compare it with the AWS completed by the QC staff. For comparison purposes, the QC supervisor will record the data on corrections of any data elements from each appraisal work sheet on a separate Quality Control Comparison Sheet for each test parcel. A copy of the Quality Control Comparison Sheet is attached. This comparative data will identify the similarity or differences in the data collected by the contractor data collectors and the QC staff.

Additionally, the QC supervisor will get and record the indicated value for the parcel, based on the data collected by the contractor and by the QC staff, which will indicate the impact on value from data differences. A third comparison will be made between the market data obtained by the contractor data collectors and the QC staff, to test the consistency and accuracy of this supplemental information that is gathered during the data collection project.



The analysis and reporting of quality test results will be done by the QC supervisor and the Manager of the Audit Unit. Reports will be made weekly to the contractor and internally to the Director of Operations. These analyses and reports will focus on measuring the quality of the data collected by the contractor, identifying particular problems that may occur, and determining corrective actions that should be taken. The types of information and quality measures to be reported will include such as (a) frequency of types of errors, by data elements, by data collector team, by class or occupancy of property, (b) the magnitude or impact of errors on value, in terms of the number or percentage of test cases which fall into different ranges or percentages of differences in value between the contractor collected data and the QC staff.

The corrective actions will take a variety of forms, depending naturally on the types of problems or errors that are encountered. These may include such things as retraining of designated data collectors, specific supplemental instructions on the handling of particular data elements where a high frequency of errors occurs, closer supervision of certain data collector teams or on data collection on certain classes or occupancies of property. The goal is to assure high quality of data by identifying and resolving problems that may occur. This will be accomplished by means of close and cooperative working relationships between the Contractor and the Quality Control Staff and other Assessing Department officials. One guideline where more extensive recollection of data would be necessary is: if errors persist for any data collection team where the differences in indicated values exceed 10% in more than 20% of the test sample, it will be necessary to require that entire batches be collected a second time under closer supervision.



R. M. Bradley Permit Collection

R. M. Bradley's contract was amended to assist the Valuation Unit in the maintenance process for fiscal '89. The effort is concentrated on residential and commercial properties with status codes (R-renovation, C-new construction, A-abandoned), and properties which were issued a building permit during calendar 1987. (The permit information is furnished to this department from the Building Department). R. M. Bradley is not responsible for wards 3, 4, and 5 nor the following property types; exempt, nursing homes, subsidized housing or funeral homes.

For the purposes of consistency, the same procedures for drawing the random sample, field inspection and value impact analysis were established among the valuation, quality control and data management units.

R. M. Bradley began this collection effort on January 18, 1988 and has currently collected information on approximately 2500 parcels. The following is an analysis of the accuracy and consistency of their employees.

Commercial: 32 parcels
7 parcels (+/-) 10 percent

Residential: 60 parcels:
3 parcels (+/-) 10 percent

Value listings are still pending for two weeks.









